K. V. Krombein

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ENTOMOLOGICAL NEWS

DECEMBER, 1938

Vol. XLIX No. 10

CONTENTS

Benesh—Descriptions of some new forms of Pseudolucanus capreolus. (Coleoptera: Lucanidae). 271
Leussler—An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera). 275
Reinhard—The Egg-laying and Early Stages of the Robber Fly, Erax aestuans. (Diptera: Asilidae). 281
Knowlton and Harmston—Notes on Utah Plecoptera and Trichoptera. 284
Evans—Migration of Monarch Butterflies (Lepid.: Danaidae). 287
O'Byrne—An Unusual Nesting Site of Polistes rubiginosus Lept. (Hymenoptera: Vespidae) 288
Current Entomological Literature. 290
Review—Bulletin of the Cheyenne Mountain Museum–Catalogue. . . . 296
Review—The Genus Septobasidium 297
Erratum 298
Doings of Societies—Rocky Mountain Conference of Entomologists . 299
Dr. Eugene Murray-Aaron Convalescing 300

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ENTOMOLOGICAL NEWS

VOL. XLIX. DECEMBER 1938 No. 10

Descriptions of some new forms of Pseudolucanus capreolus. (Coleoptera: Lucanidae).

By BERNARD BENESH, North Chicago, Illinois.

PSEUDOLUCANUS CAPREOLUS (L.).

1764. *Scarabaeus capreolus* L., Museum Ludovicae Ulricae, p. 32.

A recent examination of some preserved specimens of our common stag beetle, *Pseudolucanus capreolus* (L.), disclosed two examples which are worthy of record. Taken in company with 120 others having typical mandibular characters, on my annual trips in 1935 and 1936 to Deer Lodge, Morgan County, Tennessee, they were believed, at the moment of discovery, to be a hitherto undescribed form or perhaps a new species. To settle this question to my satisfaction, the specimens were sent to Dr. E. A. Chapin, Curator of Insects, U. S. National Museum, for inspection, who, on returning the two examples, submitted additional material for reference from the National Collection, recommending their description. I am under deep obligation to Dr. Chapin, for the kindly loan of the material in the National Collection, and thank him heartily for the opportunity to figure and describe the possible variations which we may encounter in our stag beetles.

All the examples, that is, the two males in my own cabinet and four males from the National Collection, are of intermediate size, ranging from 19.75 to 23.5 millimeters. In comparison with a magnificent male of 39 mm., the six forms appear to be mere dwarfs. They differ to a great extent in mandibular dentition; the typical male is designated as Form *A*, and there is even an edentate phase, which is, however, not the smallest individual as could be surmised, but compares favorably as to size with the other multidentate forms, which, it appears, are relatively uncommon in occurrence.

As is well known, the constant form of this species is equipped with symmetrical mandibles, esplanate dorsally, armed internally with a single obtuse, slightly subdorsal tooth, the position of which varies from the apical third to the middle of the mandible. In the specimens before me, these subdorsal teeth are not so well developed, being represented by a simple conical denticle, or, in one instance entirely lacking. For convenience, the subdorsal tooth is called *upper,* and the additional teeth noted, *lower;* they vary in size and position, as indicated in the subjoined descriptions.

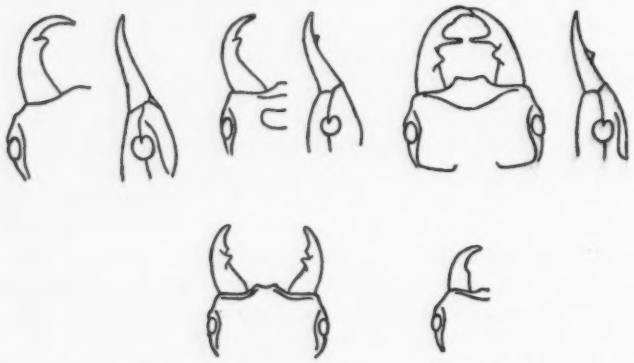


Fig. 1 Fig. 2 Fig. 3
Fig. 4 Fig. 5

Forms of *Pseudolucanus capreolus* (L.). Fig. 1, Form A, typical; 2, *nigricephalus* ab. nov.; 3, Form C; 4, Form D; 5, Form *muticus* (Thunberg.).

FORM A. FIG. 1.

Typical male of the largest development in my possession, purposely selected for illustration, measures 39 mm. with mandibles. Dark chestnut, shining. Mandibles strongly incurved, esplanate dorsally, with a distinct subdorsal (upper) tooth, not visible when viewed from the side (fig. 1).

No(rthern) ILL(INOIS). 22-VI-30. Collected by B. Benesh, near Libertyville, in a deciduous forest with beeches predominating, at dusk. Accession No. 649.

PSEUDOLUCANUS CAPREOLUS **nigricephalus** ab. nov. FIG. 2.

A distinct new form, readily distinguishable by its coloration and nearly erect mandibular subdorsal tooth, readily seen when viewed laterally; 34 mm. long, highly polished, shining. Head and pronotum entirely black, the latter becoming gradually lighter in shade towards the base, where it matches the dark chocolate-brown elytra. Head nearly destitute of the semicircular occipital carinae present in Form *A*, sloping gently from the vertex to front, with a frontal, transverse kidney-shaped depression, between and on line with the eyes. Mandibles not so strongly curved at apex as in the preceding form, more cylindriform, with the subdorsal tooth more elevated, and exposed to view from the side (fig. 2). Venter and legs distinctly concolorous (dark chestnut).

Type: 1 ♂ No (rthern) ILL(INOIS). 10-VI-28. Taken at Beach (now Dunes Park) by the writer and in his collection No. 653. Another example of this distinct aberrant is preserved in the collection of Mr. J. W. Angell, New York, which I have had the privilege to examine during my brief visit to that metropolis in 1932.

FORM C. FIG. 3.

Multidentate, cherry-red, 23.25 mm. long. Mandibles symmetrical, uniformly curved from base to apex, cylindriform, more coarsely punctuate than in the preceding two forms. Subdorsal (upper) tooth indicated by a conical denticle and, anterior to this, a lateral (slightly lower) acute prong pointing at a right angle inwards (fig. 3). Legs reddish-yellow.

Type: 1 ♂, Deer Lodge, TENNESSEE, June 1936. B. Benesh, collector and in his collection No. 4346.

FORM D. FIG. 4.

Multidentate, dark chocolate-brown (possibly discolored in the preserving fluid), 22.5 mm. long. Mandibles symmetrical, with the upper tooth present as a conical tubercle which is bigger than the lower and feebly indicated anterior tooth (fig. 4). Legs obscurely reddish.

Type: 1 ♂, Deer Lodge, TENNESSEE, June 1935. B. Benesh, collector and in his cabinet No. 4347.

FORM E.

Similar to preceding form, 23.5 mm. long. Both the acute lower and the blunt upper tooth are present, one above the

other, as very feebly developed protuberances.

Type: 1 ♂, Mt. Airy, P(ENNSYLVANI)A. Coll. P. Laurent, Geo. M. Greene collection, U. S. N. M.

FORM F.

Each mandible has the acute lower tooth as a small denticle; basally from this tooth a second not so well developed; blunt upper tooth lacking on both mandibles. Length 20 mm.

Type: 1 ♂, Nashville, TENN(ESSEE), 11-23, Osborn. Wickham Collection 1933, U. S. N. M.

FORM G.

Left mandible with an acute lower tooth moderately well developed, the right mandible with the acute lower tooth developed only as a small denticle, the normal blunt upper tooth lacking on both. 19.75 mm. long.

Type: 1 ♂, Gipsy Moth Lab., July 8, 1910. At arc lights. Wilmington, MASS(ACHUSETTS). 1910. U. S. N. M.

PSEUDOLUCANUS CAPREOLUS form MUTICUS (Thunb.). FIG. 5.

Edentate form, to which Thunberg[1] applied the name *muticus*, 23 mm. long, fig. 5. Mandibles nearly straight for two-thirds their length, thence gently curved to apex; broad to about the middle, suddenly tapered to a point; no trace of either tooth on either mandible.

1 ♂, Plummers Island, M(ARYLAND)D. 1. 7. 19. Schwarz and Barber Collection. U. S. N. M. Several others, not as yet pinned, from Deer Lodge, Tenn., in the writer's possession.

It is interesting to note that, out of the five multidentate specimens, three are from the State of Tennessee. In some quarters, especially continental Europe, these would be considered as "Uebergänge," "Brücken" or "Geographische Rassen." However, this interpretation is unacceptable, in view of the two specimens taken at some distance from Tennessee, i. e., in Massachusetts and Pennsylvania. These specimens lend support to my statement[2] that certain forms, thus far described as subspecies or regional races, will, at some time, be taken throughout the range of a species and lead us to deny to these so-called subspecies or geographical races the status bestowed upon them.

[1] THUNBERG, C. P. Lucani Monographia, Mem. Soc. Nat., Moscow, I. p. 198 (1806).

[2] BENESH, B. Some notes on Boreal American Dorcinae. Trans. Amer. Ent. Soc. LXIII, p. 14 (1937).

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. LEUSSLER, Omaha, Nebraska.

(Continued from page 218)

76. AGLAIS J. ALBUM (Bdv. and Lec.). A dozen specimens taken in War Bonnet and Monroe canyons, Sioux County in July, 1917, and many more seen. One pupa found on black birch July 20, which gave forth its butterfly July 24.

77. A. MILBERTI (Godt.). Not rare in Sioux County in late June. Has not been recorded from other parts of the state.

78. A. ANTIOPA (L.). Found wherever elm or willow grows; two broods, latter half of June and middle of August, the latter hibernating.

79. CYNTHIA ATALANTA (L.). Very common over the entire state; at least two broods, for it is on the wing from April to October.

80. C. VIRGINIENSIS (Dru.). Found everywhere in the state. Common in most years but rare in others. Flies from May to October.

81. C. CARDUI (L.). Found everywhere in the state, and usually common; several broods.

82. JUNONIA COENIA Hbn. Fairly common, at least in the eastern part of the state; two broods, June and August.

83. BASILARCHIA ARTHEMIS (Dru.) race ASTYANAX (Fabr.). Common in the eastern part of the state. Two broods, June and August. Specimens of forms *viridis, inornata,* and *purpuratus* have been taken at Omaha.

84. B. WEIDEMEYERII (Edw.). Very abundant in the canyons of Sioux County in June; also 1 specimen Belmont, May 13, 1890 (Coll. Univ. Nebr.). Just where in the state this species replaces the preceding is not, at present, known.

85. B. ARCHIPPUS (Cram.). Common. Has been taken in all parts of the state; two broods, June and August. Specimens with the median black line on secondaries obsolescent, ab. *lanthanis* Cook and Watson, are occasionally found.

86. CELTIPHAGA CELTIS (Bdv. and Lec.). Fairly common; typical in the eastern part of the state, but undergoing a change as we go westward. Sioux County specimens are extremely large, and the majority of them have two ocelli on primaries; they vary in ground color from pale grey and dark grey to a decided red-fulvous. This race is nearest to the form which Holland figures as *montis* (Edw.) but which, according to my

understanding is not true *montis*. Specimens from the central part of the state are intermediate.

C. CELTIS ab. INORNATA (Wolc.). An extremely interesting aberrant individual was taken near Ashland June 14, 1913 (Wolcott) in which the median band of white spots on forewing is wanting, and the markings on upper side of hind wings are obliterated, giving the insect a strange appearance. This ab. was described and figured in Ent. News, March, 1916, by Dr. Wolcott. Type, now in the writers' collection.

87. C. CLYTON (Bdv. and Lec.). Found at Omaha and vicinity where it is quite plentiful. Single brooded, but butterflies emerge over an extended period. The earliest emerging ones are mostly *clyton clyton*, while the later ones are mostly form *proserpina* (Scud.). From one laying of eggs there was produced every gradation from *clyton clyton* to *clyton proserpina*.

88. ANAEA ANDRIA (Scud.). Common at Lincoln, Meadow and Oconto; less so at Omaha. Has also been at Cedar Bluffs and Mitchell (Dawson). Flies in October, hibernates and flies again in the spring.

89. LIBYTHEA BACHMANII (Kirt.). Not common. Occasionally met with at Omaha and Lincoln, and has been taken at Kearney (Black) and Mitchell (Dawson). On October 20, 1916, Dawson observed a great number at Mitchell, apparently migrating.

90. STRYMON MELINUS (Hbn.). Fairly common as a rule. Has been taken in every month from May to October, and clear across the state from Omaha to Harrison.

91. S. ACADICA (Edw.). This also has been taken in the eastern, middle and western part of the state. Common at Harrison and Oconto. Flies in July.

92. S. TITUS (Fabr.). This also is restricted to certain localities, but has been found entirely across the state. Flies in July and is fond of the flowers of butterfly weed (Asclepias tuberosa).

93. S. EDWARDSII (Saund.). Found, so far, only at Omaha, where it was extremely rare until July, 1929, when it appeared in large numbers in one locality having a growth of young scrub oak and butterfly weed, and it has been found there in abundance every year since.

94. S. CALANUS (Hbn.). Found in restricted localities in various parts of the state. In these localities it is sometimes found in numbers. Omaha, Lincoln, Rulo and Bazile Mills. Middle of June to middle of July.

95. S. LIPAROPS (Bdv. and Lec.) race STRIGOSA (Harr.). Rare. Specimens from Sioux County; also 1 from West Point. (Coll. Univ. Nebr.); 1 from Bazile Mills June 17, 1918 (Shoemaker) and 1 from Wauneta June 21, 1933.

96. MITOURA SIVA (Edw.). A single specimen on cedar, in Bull Canyon, Banner County, June 2, 1919. As the slopes of this canyon abound in cedars, *siva* may be expected to be established here, but the day I visited this region was most unfavorable for collecting — cloudy, with temperature near freezing.

97. INCISALIA HENRICI (G. & R.). Found in numbers in a draw or ravine near Omaha, April 17, 18, 24, and May 8, 1915. In the following year a single specimen was found in the same locality but none have been found since although diligently searched for year after year.

98. I. ERYPHON (Bdv.). Common in Sioux County in late May and early June. With respect to the band on under side of forewings, as well as other characters, the Sioux County form appears to be intermediate between eastern *niphon* and western *eryphon* but most of the specimens are closer to the latter.

99. FENISECA TARQUINIUS (Fabr.). Rare. Several specimens taken in various localities in and about Omaha; also one specimen at Lincoln. One full grown larva found at Omaha, July 26, 1913, among a colony of wooly plant lice reared to imago August 4.

100. LYCAENA DIONE (Scud.). Common. Found everywhere in the state where bitter dock grows. Single brooded. Latter part of June.

101. L. THOE (Guer.). Common. Extends at least as far west as Kearney and Oconto. Frequents moist area where knot weed grows. Double brooded, June and August. The species shows a tendency toward fusion of spots, to examples of which Gunder has given the name tr. f. *wyatti*.

102. L. HELLOIDES (Bdv.). Not found in the eastern part of the state but quite common in Cherry County and further west. At least two broods; first early June, second after the middle of July.

103. L. HYPOPHLAEAS (Bdv.). Rare. Present at Omaha in fair numbers, in a meadow well sprinkled with white clover, in the years 1915 and 1916, since which time, however, it has been met with only once or twice.

104. L. RUBIDUS (Behr) race *sirius* (Edw.). Common in the western part of the state. Taken in large numbers at Harrison the latter half of June, 1917, on lupine. Spotting on

under side of hind wing is variable, very distinct in some specimens and only faintly indicated in others.

105. LEPTOTES MARINA (Reak.). Although apparently a long ways from home, fresh specimens of this species have been taken both at Omaha and Lincoln. Omaha June 25, 1914; September 3, 7, 16, 17, October 7, 1916; Lincoln October 7, 1918.

106. BREPHIDIUM EXILIS (Bdv.). Another California species which occasionally makes its appearance in Nebraska. 1 specimen, Lincoln August 10, 1901 (J. C. Crawford); 1, Lincoln, July 11, 1920 (R. W. Dawson); 1, Plattsmouth, September 16, 1931 (Leussler).

107. HEMIARGUS ISOLA (Reak.). Not uncommon and found everywhere in the state. On the wing from May to October; most numerous in September.

108. EVERES COMYNTAS (Godt.). Exceedingly common in the eastern half of the state; quite variable, the males of the summer brood having a much broader black border than those of the earlier brood.

E. COMYNTAS race HERII (Grin.). Sioux County specimens match well with specimens from Arizona.

109. PLEBEJUS MELISSA (Edw.). Extremely common in the western part of the state but growing less so as we go eatsward, until at Lincoln it is very rare, and at Omaha I have taken but a single specimen (September 14, 1918), the only one seen in 28 years collecting there. Double brooded June and August.

110. P. ICARIOIDES race LYCEA (Edw.). Extremely common in Sioux County where long series have been collected in June and July. Quite variable in size, shade of blue and width of black border. The under side is more constant. Not recorded from elsewhere in the state.

111. P. SHASTA (Edw.). race MINNEHAHA (Scud.). Apparently rare. 1 male and 1 female, Sioux County, June 21, 1890. (Coll. Univ. Nebr.); 1 male, Sioux County, June 21, 1911 and several of both sexes same locality July 14, 1917 (Leussler).

112. P. ACMON (West and Hew.). Specimens from the following localities: Clear Lake, Cherry County; Harrisburg, Banner County; Harrison, Sioux County. Double brooded, June and August. These should perhaps be referred to *lupini* (Bdv.). The dark marginal border is broad and not clearly defined, and the orange band on secondaries is composed of more or less separated spots rather than a continuous band.

113. PHAEDROTES PIASUS (Bdv.). race *daunia* (Edw.). Found in Sioux County, in June, but not very common.

114. GLAUCOPSYCHE LYGDAMUS (Dbldy.) race ORO (Scud.). The range of this species in the state is restricted to the extreme western part. Dr. Wolcott and I found it abundant near Harrisburg, May 30, 1919 and have also taken it in Sioux County in June.

115. LYCAENOPSIS PSEUDARGIOLUS (Bdv. and Lec.). The spring form of this species is one of the earliest butterflies, appearing about the middle of April; fairly common in eastern part of the state. Very rarely a specimen is met with approaching form *marginata* (Edw.).

L. PSEUDARGIOLUS gen. aest. NEGLECTA (Edw.). This summer form is more abundant than the spring form; often found in large numbers in June and July and again in August. There is considerable variation in size of individuals of the summer brood.

116. EPARGYREUS TITYRUS (Fabr.). Common everywhere in the state; On the wing from May to October. Larvae on wistaria, locust and rose acacia.

117. THORYBES PYLADES (Scud.). Rather common in open spaces in or near woods, in June and July. Found from the eastern to the western state boundary.

118. T. DAUNUS (Cram.). Less common than the preceding though as widely distributed. Has been taken as early as May 8, and as late as September 5, and in every month between.

119. PYRGUS SCRIPTURA (Bdv.). Rare. A single specimen, Prairie Dog Creek, near Harrison, Sioux County, June 29, 1911 (Wolcott).

120. P. TESSELLATA (Scud). One of our very common skippers; on the wing everywhere from May till late in October.

121. PHOLISORA CATULLUS (Fabr.). Very common everywhere; and, like the preceding species, on the wing from May to October.

122. P. HAYHURSTII (Edw.). Not nearly as common as *catullus* and far more local. Specimens from Omaha, Cedar Bluffs and Roca. Two broods, latter part of May and Middle of July.

123. ERYNNIS BRIZO (Bdv. and Lec.). Rare. A few specimens taken at Omaha and Weeping Water. Earliest capture April 23, latest May 15.

124. E. PERSIUS (Scud.). Common. Two broods; first

very end of April, second middle of August. Individuals of the later brood average larger than those of the earlier brood. Specimens from various points in eastern half of state.

E. PERSIUS race AFRANIUS (Lint.). Fairly common in Sioux County late in May and early June. Small race, hoary gray on upper surface, with distinct light fulvous spots on hind wings.

E. PERSIUS race LUCILIUS (Scud. and Burg.). Rare. Occasional specimens taken at Omaha match up well with specimens from Great Notch, N. J.

125. E. MARTIALIS (Scud.). Fairly common in one piece of native prairie land on the outskirts of Omaha, the latter half of July; also found, though far less common, in the first half of May. Specimens also from the sand hills near Halsey. Apparently very local.

126. E. JUVENALIS (Fabr.). Common and distribution general. Double brooded; the first brood, latter part of April and early part of May being by far the more numerous.

127. E. HORATIUS (Scud. and Burg). Less common than *persius* and *juvenalis*. Early May and again in late summer. Omaha, Cedar Bluffs and Nebraska City.

128. E. FUNERALIS (Scud. and Burg). Rare. 1 specimen, Cedar Bluffs, May 30, 1913 (Wolcott) and 1, Fremont, May 30, 1921 (Leussler).

129. ANCLOXYPHA NUMITOR (Fabr.). Very common in grasses around small streams; appears about June 1 and is present then throughout the summer. Omaha, Roca, Valley.

130. OARISMA GARITA (Reak.). Quite common near Harrison in late June. Frequents moist grassy spots and is probably to be found elsewhere in the western part of the state also. Specimens are somewhat larger than those from Colorado and Arizona.

131. CHAEREPHON RHESUS (Edw.). A single specimen taken in Sioux County by Merritt Cary in May, and now in the Collection of the University of Nebraska.

132. C. SIMIUS (Edw.). Fairly common in Sioux County where a number of specimens were taken in the latter part of June, 1911, and a larger number in July, 1917. It has a curious habit of settling deep down on the flower heads of white thistle with wings folded tightly back, in which position it greatly resembles the tuft of the flower and is easy to approach.

133. HESPERIA UNCAS (Edw.). Not uncommon in the western part of the state. I have taken it at Valentine, Benkleman and Harrison. Flies in June and July.

(To be continued)

The Egg-laying and Early Stages of the Robber Fly, Erax aestuans. (Diptera: Asilidae).

By EDWARD G. REINHARD, University of Scranton.

During August, 1932, while vacationing at Winthrop Harbor in northeastern Illinois, I became interested in observing the egg-laying habits of a common robber fly, later determined by Mr. C. T. Greene of the U. S. Bureau of Entomology as *Erax aestuans* L. These flies attracted attention because of their curious partiality for the fruiting spikes of the self-heal, *Brunella vulgaris*, a very common plant in the vicinity, which they used as shelters for their eggs. Since the behavior of the Asilidae has been a neglected field of study in American entomology the following observations, though scanty, seem worthy of record.

I first noticed females engaged in oviposition on August 8th and saw the flies *in copula* on the same day. There is no reason to suppose, however, that this was the very beginning of the mating season, since eggs were collected on August 9th from which the larvae had already hatched. Thereafter, for a period of ten days, whenever the weather was clear and warm, females could be found in abundance probing with their ovipositors the dried heads of *Brunella* or rarely of some other plant. When the capsules were examined after a fly had been at work they usually showed a clutch of eggs deposited on top of the seeds.

On the day following my initial observation it rained, and this proved a fortunate occurrence for it taught me a simple method for finding the eggs. When the fruiting spikes of *Brunella* are moistened the individual capsules stand out at right angles to the main stem and their lips open widely so that one can easily see what is within. Instead of prying each capsule apart to find the one containing *Erax* eggs, as must be done when the spikes are dry, it is only necessary to dip the spikes in water for a moment. Then, thanks to hygroscopic unfolding movements, the capsules gape open and reveal their contents to a quick glance of inspection.

By this method quite a number of egg masses were found in spikes collected purely at random. It also demonstrated what a haven these seed pods were for various small arthropods seeking seclusion. Spiders, mites, a sleeping little wasp, cocoons of *Chrysopa*, and pupae of microlepidoptera were some of the occupants that found shelter there.

A single capsule of *Brunella* may contain as many as ninety eggs of *Erax aestuans*, although the average number of eggs per cluster amounted to about forty. When the flies oviposited in *Achillea, Rudbeckia*, or *Verbascum* heads, as occasionally happened, the available space limited the eggs to a single one per crevice, or to small clusters of four to ten.

The eggs of this species of robber fly measures approximately 0.8 mm. x 0.25 mm. The shell is rather tough, does not lose its shape after the embryo has hatched, and bears a fine granular network, presumably the imprint of the chorion-secreting cells.

Eight freshly-laid egg masses, totalling 440 eggs, were placed in gelatine capsules and kept under observation to determine the incubation period. Hatching began on the seventh to ninth day after laying and continued for each cluster over a period of three or four days. Movement could be detected within the egg two days before hatching. The larva is doubled up within the shell, head touching tail. By a forward thrust of its hooked head the larva ruptures the shell, then slides in and out the opening to enlarge it, and finally squeezes through head first and crawls away.

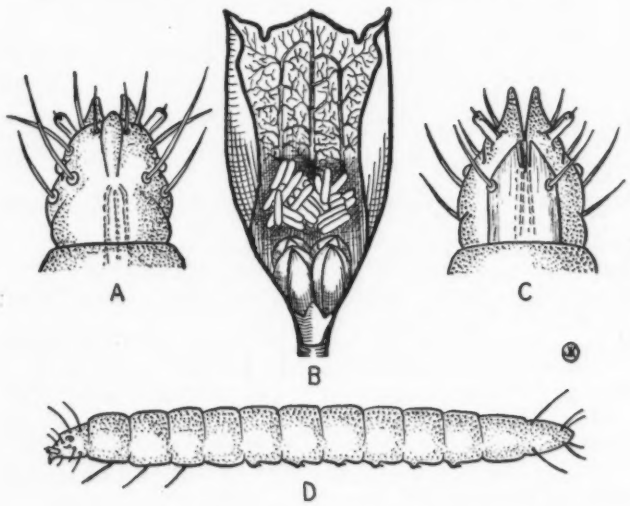
The young larva can cling with its posterior extremity and when crawling leaves a moist trail. Apparently it excretes from the anal region a fluid that assists the larva in holding on to objects over which it creeps.

Several newly-hatched larvae were placed on *Brunella* spikes to determine how they would descend to earth. All simply fell off when they eventually reached an extremity. Larvae put on the surface of a can of loose earth penetrated to the bottom, but a batch of newly hatched larvae placed on the hard packed soil outdoors failed to penetrate and were found the next day

still alive but lying where they had been placed.

On the assumption that *Erax* larvae are predaceous on white grubs, as several writers have stated, I tried to feed my maggots by providing them with small *Lachnosterna* grubs. Not one attached itself to the grubs; instead the maggots died but the grubs survived. An attempt to feed them on ant larvae also proved unsuccessful. Much digging in the vicinity of the robber fly nesting sites failed to produce asilid larvae, and, vacation days having come to an end, I was forced to leave Winthrop Harbor without carrying the life history of *Erax aestuans* any farther. Later, I had an opportunity to read D. Melin's thorough work "Biology of the Swedish Asilids" (Zoologiska Bidrag fran Uppsala, *8*:1-317, 1923) and learned there that despite common belief asilid larvae are not carnivorous as a rule but feed on vegetable substances of a solid nature.

The chief structural features of the first larval instar of *Erax aestuans* are illustrated in the accompanying figures.



Eggs and first instar larva of *Erax aestuans* L. A. Dorsal view of head of larva, X 150. B. Capsule of *Brunella vulgaris* opened to show eggs lying in cavity above the seeds, X 7. C. Ventral view of head of larva, X 150. D. Lateral view of larva, X 40.

Notes on Utah Plecoptera and Trichoptera[1].

By G. F. KNOWLTON and F. C. HARMSTON [2].

Stone flies and caddis flies form an important source of fish food in most western lakes and streams. Incomplete knowledge of the species present and their distribution in Utah led to the following report.[3]

PLECOPTERA—STONEFLIES.

ACRONEURIA PACIFICA Banks. Brigham Canyon, June 18, 1937; Duchesne; Logan; Mantua; Roosevelt, March 21, 1937; Sevier; Trout Creek (E. Gardner). Also at Lamezella Canyon, New Mexico (H. B. Stafford) and Yellowstone National Park, Wyoming.

ALLOPERLA COLORADENSIS (Bks.). Big Cottonwood Canyon, June 15, 1937; Logan.

CAPNIA COLUMBIANA Clsn. Logan, March and May, 1937; Logan Canyon, April, 1937.

C. ELONGATA Clsn. Logan Canyon, April 14. 1937.

C. NANA Clsn. Northern Utah.

DICTYOPTERYGELLA KNOWLTONI Frison. Logan, June 23, 1929.

EUCAPNOPSIS BREVICAUDA Clsn. Big Cottonwood Canyon, April 24, 1937; Brigham Canyon; Logan Canyon.

ISOPERLA FULVA Clsn. Blacksmith Fork Canyon, May 4, 1937; Logan Canyon (C. F. Smith); Ogden Canyon; Weber Canyon.

I. PETERSONI Clsn. Logan, October 5, 1937; Logan Canyon (D. E. Hardy).

LEUCTRA BRADLEYI Clsn. Provo Canyon, April 10, 1917.

NEMOURA CALIFORNICA Clsn. Roosevelt, June 16, 1935.

N. CINCTIPES Banks. Brigham Canyon, May 1, 1937; Logan; Salt Lake City; Sunset; Wellsville.

N. GLABRA Clsn. Brigham Canyon, March 29, 1937; City Creek Canyon; Logan Canyon; Mantua; Morgan; Salt Lake City.

N. LOBATA Frison. Logan and Logan Canyon, October, 1937 (L. L. Hansen).

PERLODES AMERICANA (Klap.). Logan Canyon, April 20, 1937.

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

[2] Associate entomologist and research assistant, respectively.

[3] The writers are indebted to Drs. T. H. Frison and H. H. Ross for the identification of most of the material recorded. Unless otherwise indicated, collections were made in Utah and by one or both of the writers.

PERLOMYIA UTAHENSIS N. & C. Brigham Canyon, April 24, 1937.

PTERONARCELLA BADIA Hag. Blacksmith Fork Canyon, July 9, 1937; Fruitland, September 17, 1936; Logan, (W. P. Nye); Strawberry Valley, May 2, 1935; Whiterocks.

PTERONARCYS CALIFORNICA Newport. Big Cottonwood Canyon, June 27, 1937; Blacksmith Fork Canyon; Logan (R. E. Nye); Ouray; Salt Lake City; Sevier; Springville; Uinta Mountains.

P. PRINCEPS Banks. Logan, July 23, 1929; Trout Creek (J. A. Rowe & W. L. Thomas).

SIALIS CORNUTA Ross. Fruitland, March 30, 1937; Red Creek.

TAENIOPTERYX NIGRIPENNIS Bks. Blacksmith Fork Canyon, May 4, 1937; Brigham Canyon; City Creek Canyon; Farmington; Mantua; Ogden; Weber Canyon.

T. OCCIDENTALIS Bks. Logan Canyon, March 14, 1937.

TRICHOPTERA—CADDIS FLIES.

AGAPETUS DEBILIS Ross. Logan Canyon, August 29, 1937 (W. P. Nye).

ARCTOPSYCHE GRANDIS Banks. Logan, May 30, 1937; Spanish Fork, July 9, 1937 (Knowlton-H. E. Dorst). Also at Riverdale, Idaho, July 17, 1937 (C. F. Smith-Harmston).

ASYNARCHUS CENTRALIS (Bks.). Logan Canyon, August 1, 1937 (Smith-Harmston).

BRACHYCENTRUS ASPILUS Ross. Logan, August 8, 1937; Logan Canyon, July 25, 1937.

B. OCCIDENTALIS Bks. Blacksmith Fork Canyon, May 4, 1937; Logan, May 1, 1937; Logan Canyon, May 8, 1937 (Nye).

CHEUMATOPSYCHE COMPYLA Ross. Currant Creek, June 30, 1937.

C. PETTITI Bks. Logan Canyon, July 25, 1937; Wellsville, May 1, 1937.

CHIMARRHA UTAHENSIS Ross. Gandy, September 26, 1936 (C. J. Sorenson).

DISCOSMOECUS ATRIPES (Hagen). Logan, September 13, 1936.

D. UNICOLOR Bks. Logan, August 28, 1937.

DOLOPHILUS GABRIELLA Bks. Logan, September 28, 1937.

GLOSSOSOMA ALASCENSE Bks. Mantua, May 1, 1937.

G. VERDONA Ross. Big Cottonwood Canyon, April 24, 1937; Kanesville, May 15, 1937; Logan Canyon, April 20, 1937.

GLYPHOSYCHE ORMIAE Ross. Logan, November 3, 1934 (C. F. Smith); Smithfield, October 20, 1936 (H. F. Thornley).

G. SUBBOREALIS Bks. Logan, October 3, 1933 (T. O. Thatcher).

HESPEROPHYLAX CONSIMILIS Bks. Northern Utah, 1937.

H. MAGNUS Bks. Logan, August 14, 1937 (K.-Nye); Manila, August 11, 1937; Monticello, September 4, 1937.

H. OCCIDENTALIS Bks. Brigham, April 24, 1937; Logan, September 6, 1937 (K.-Nye); Ogden Canyon, June 21, 1937 (K.-Smith).

HYDROPSYCHE CALIFORNICUS Bks. Logan Canyon, October 5, 1937 (D. E. Hardy).

H. COCKERELLI Bks. Blacksmith Fork Canyon, June 20, 1937 (Smith-Harmston); Ogden, August 18, 1937; Weber Canyon, June 10, 1937 (C. J. Davis).

H. OCCIDENTALIS Bks. Logan, August 14, 1937; Ogden Canyon, June 21, 1937 (K.-Hardy); Spanish Fork, July 19, 1937 (K.-Dorst); Weber Canyon, August 18, 1937.

H. OSLARI Bks. Logan, August 16, 1937; Logan Canyon, July 25, 1937.

LEPIDOSTOMA KNOWLTONI Ross. Clinton, June 21, 1936.

L. PLUVIALIS (Milne). Logan, July 29, 1937; Logan Canyon, July 4, 1937 (Smith-Harmston).

L. UNICOLOR Bks. Logan, August 9, 1937.

LIMNEPHILUS EXTERNUS Hagen. Logan, August 20, 1937; Strawberry Valley, August 10, 1933 (E. W. Anthon).

L. PRODUCTUS Hagen. Logan, August 14, 1937 (K.-Nye); Spanish Fork, August 17, 1937.

L. TALOGA Ross. Indian Writings, San Rafael, September 11, 1937 (W. P. Nye).

L. THORUS Ross. Blue Creek, August 28, 1934 (Smith).

MACRONEMA ZEBRATUM Hagen. Roosevelt, August 14, 1937.

OECETIS INCONSPICUA (Walker). Daniel's Canyon, June 30, 1937; Delta, August 18, 1937.

OLIGOPHLEBODES MINUTA Bks. Brigham Canyon, June 27, 1937 (G. F. & M. W. Knowlton); Currant Creek, June, 1937; Smithfield, July 11, 1937 (Smith & Harmston).

PHILOPTAMUS AEQUALIS Bks. Logan, July 5, 1937 (G. F. & M. W. Knowlton).

RHYACOPHILA BASALIS Bks. Logan Canyon, July 4, 1937 (Smith-Harmston).

R. VERRULA Milne. Logan, October 2, 1937 (R. E. Nye).

TRIAENODES TARDA Milne. Logan, August 29, 1937.

Migration of Monarch Butterflies (Lepid.: Danaidae).

By CHARLES A. EVANS, M.D., Department of Bacteriology, University of Minnesota, Minneapolis.

In his monograph on the "Migration of Butterflies," Williams [1] devotes an entire chapter to the Monarch (*Danaida plexippus*). By collecting and correlating records from all over the country, he shows that this species, which breeds from the Gulf States north to Hudson's Bay, congregates in large numbers to migrate southward in the fall. Records from Florida and California show that at least in these two states it spends the winter, as vast numbers have been seen clinging to pine trees at this season. In late February or early March, they disappear from these locations and begin to move northward as the milkweed comes out. The return trip is inconspicuous as the butterflies go singly or in small groups instead of in the spectacular masses which are seen in the fall.

Williams was able to find only three records of migrating monarchs in Wisconsin. All three were observations in late August or early September, two in 1868 at Madison and Racine, and one in 1900 at Milwaukee. In September, 1935, I observed a migration of monarch butterflies near Grafton, Wisconsin, about 20 miles north of Milwaukee. On September 4, while seated about 30 yards from the shore of Lake Michigan, I counted 200 drifting between myself and the lake in 10 minutes and 20 seconds. All were going southward, moving in a persistent but not hurried manner and stopping occasionally on some tree or flower. They did not venture out over the lake. For at least a quarter of a mile back from the lake, they were equally numerous. I was unable to investigate beyond this distance. However, calculating on the basis of the 200 butterflies counted, it can be estimated that they were passing southward at the rate of approximately 17,000 an hour in the quarter mile strip observed. This movement continued at the same rate all day and had been going on for several days before September 4th. On the following days the number of passing monarchs decreased rapidly until on September 9th none were seen on a brief visit to the same place. On September 10th

only one of these butterflies was seen and that was frantically trying to find a way through a wire fence which blocked its way to the south. It was watched several minutes flying against the fence repeatedly, trying to find a way through. The persistence of this butterfly in attempting to go southward, although any other direction would have been much easier, is interesting. Williams states that the first purpose of this monograph is "to establish by force of evidence the reality and especially the wilful nature of the undirectional flights" of butterflies. Wilful is defined as "governed by the will without regard to reason." Certainly this butterfly presented a clear-cut example of the wilful nature of an undirectional flight.

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An Unusual Nesting Site of Polistes rubiginosus Lept. (Hymenoptera: Vespidae).

By HAROLD I. O'BYRNE, Urbana, Illinois.

Rau has on several occasions (1929a, '29b, '31) described the nesting sites of *Polistes rubiginosus* Lept. as being in dark, inaccessible places within walls of buildings or in hollow trees. Nesting places seen by me have likewise been in the dark—usually in hollow trees, with entrances through holes or cracks. An exception in this respect was a nest which I observed near the south end of Reelfoot Lake, Tennessee, on April 17, 1938. This nest was in the open, attached to a branch of a small shrub about one foot above the ground. It had been newly started and consisted of only six or seven cells, including some unfinished ones. Several wasps were clinging to it—there may have been as many as eight, but the exact number was not determined because some took flight as I approached. These wasps evidently had hibernated, since it was too early in the season for a new brood to have matured.

Of the spring behavior of *P. rubiginosus,* Rau says (1929a, '30) that the females return from their place of hibernation to the old nesting site, but he has not described the resumption of nesting activity in the spring. However, the behavior of *P. annularis* Linn. at this season is of interest in this connection: At Clifton Terrace, Illinois, on April 24, 1914, Rau (1918, pp. 287-8) observed a number of queens of *annularis* clustered on the nests of the preceding year; but there were also a few nests in process of construction, on each of which from one to four queens were seen. This suggests that collaboration by more than one female in building the nests may take place in the spring. The nest of *P. rubiginosus* at Reelfoot Lake likewise seemed to be the result of cooperation by several females. Although Wheeler (1928, pp. 73 and 101) states that in temperate regions nests of *Polistes* are founded by a single fecundated female while in the tropics they may be founded by a fecundated female with several workers who are her sisters, the foregoing observations by Rau on *P. annularis* and by myself on *P. rubiginosus* suggest that the condition that prevails in the tropics has not been entirely lost in temperate regions.

It is not surprising that the spring behavior of *rubiginosus* should resemble that of *annularis* in this respect; but the selection of an exposed site instead of a dark, protected place by the wasps founding this single *rubiginosus* colony at Reelfoot Lake is a noteworthy departure from the usual nesting behavior of this species.

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Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Bedard, W. D.—An annotated list of the insect fauna of Douglas fir (Pseudotsuga mucronata) in the northern Rocky Mt. region. [4] 70: 188-197. **Carpenter, Snyder, Alexander, James, Hull.** — Fossil insects from the Creede formation, Colorado. Pt. 1. Introduction, Neuroptera, Isoptera and Diptera. [5] 45: 105-119, ill. **[Frison, T. H.]** — Entomologists Don't Rate. [12] 31: 635-636. **Gilliatt, Frederick C.**—Obituary by A. Kelsall [4] 70: 197-198. **Hyslop, J. A.**—Giving meaning to the terms, brood and generation. [12] 31: 557-559. **Lagloire, P.**—Le guide de l'amateur d'insects [98] 65: 240-252, ill. **Laing, J.**—Host-finding by insect parasites. I. Observation on the finding of hosts of Alysia manducator, Mormoniella vitripennis and Trichogramma evanescens. [Jour. Anim. Ecol.] 6: 298-317, ill. **Lameere, A.** — Precis de Zoologie. Caracteres fondamentaux des Arthropodes, les Arachnomorphes, les Crustaces. Les Myriapodes caracire fondamentax des insectes. Les insectes inferieurs. [U. Bruxelles Inst. Zool.] 3, 1933: 212-531, ill.; 4, 1935: 468 pp., ill. **Mendes, L. O. T.**—Lista dos inimigos naturaes de Dysdercus spp., observados no Est. de Sao Paulo. [105] 9: 215-217. **Meyrick, Edward.**—Obituary by A. Busck. [10] 40: 177-179, ill. **Palmer, E. L.**—Some common fresh-water insects [Nat. Mag.] 31: 477-484, ill. **Pyenson, L.**—The problems of applied entomology in Pernambuco, Brazil. Pt. 2.—A survey of some of the pests of the crops of Pernambuco [105] 9: 16-31. **Rodeck, H. G.**

—Type specimens of fossils in the University of Colorado Museum. [Univ. Col. Studies] 25: 281-299. **Salt. G,**—Experimental studies in insect parasitism, VI.—Host suitability. [22] 29: 223-246, ill. **Severin, Guillaume.**—Obituary by A. Lameere. [33] 78: 313-314, ill. **Smart, J.**—Notes on the insect fauna of the bromeliad, Brocchinia micrantha, of British Guiana. [8] 74: 198-200, ill. **Smith, R. C.**—Some Phases of entomological writing from the viewpoint of the reader. [12] 31: 563-565. **Stanley & Smallman.**—A method of determining the mean speed of movement of insects in a mass of flour. [Can. Jour. Res.] 16, Sec. D: 221-224, ill. **Whitehead, F. E.**—A proposed national contest for entomology students. [12] 31: 566-568.

ANATOMY, PHYSIOLOGY, ETC.—**Andre, M.**—Elevages de volailles decimes par le Tyroglyphus farinae. (Acariens). [Bull. Soc. Zool. France] 62: 366-367. **Brauns, A.**—Dieflugelruckbildung bei der Strandfliege Conioscinella brachyptera (Dipt.: Chloropid.) und die Beiziehungen zur Ausbilding der Flugelsinnes Kuppeln. [34] 123: 281-295, ill. **Butler, C. G.**—On the ecology of Aleurodes brassicae (Hemiptera). [36] 87: 291-311, ill. **Evans, A. C.**—Physiological relationships between insects and their host plants. I.—The effect of the chemical composition of the plant on reproduction and production of winged forms in Brevicoryne brassicae (Aphid., Hemipt.). [35] 25: 558-572. **Farstad, C. W.**—Thelyotokous parthenogenesis in Cephus cinctus (Hymen.: Cephidae). [4] 70: 206-207. **Grandjean, M. F.**—Otodectes cynotis et les pretendues trachees des Acaridiae. [Bull. Soc. Zool. France] 62: 280-290, ill. **Hopkins, G. H. E.**—Function of the "gills" in mosquito larvae. [31] 142: 482. **Kozhanchikov, I. W.**—The peculiarities of gaseous metabolism in insect tissues. [Comptes. Rend. Acad. Sci. U. S. R. R.] 19: 759-761. Physiological conditions of cold-hardiness in insects. [22] 29: 253-262, ill. **McGregor, S. E.**—Environmental factors and size variations in honeybee appendages. [12] 31: 570-573, ill. **Milne, M. J.**—Case-building in Trichoptera as an inherited response to oxygen deficiency. [4] 70: 177-180. **Patay, R.**—Anatomie, histologie et physiologie des tubes de Malpighi du Doryphore (Leptinotarsa decemlineata (Chrysomel.). [Bull. Soc. Zool. France] 62: 174-186, ill. **Patterson, N. F.**—On the external morphology of South African specimens of Micromalthus (Coleo.) [36] 87: 287-290, ill. **Poisson & Pesson.**—L'appareil circulatoire d' Icerya purchasi (Coccid.,

Monophlebinae). [Bull. Soc. Zool. France] 62: 431-435, ill. **Pringle, J. A.**—Observations on certain wood-boring Coleoptera occurring in South Africa (Lyctidae & Bostrychidae). [36] 87: 247-270, ill. **Pringle, J. W. S.**—Proprioception in insects. I. A new type of mechanical receptor from the palps of the cockroach. II. The action of the companiforms sensilla on the legs. [Jour. Exp. Biol.] 15: 101-113, ill.; 114-131, ill. **Quadri, M. A.**—The life-history & growth of the cockroach Blatta orientalis. [22] 29: 263-276, ill. **Salt, G.**—The egg-parasite of Sialis lutaria; a study of the influence of the host upon a dimorphic parasite. [116] 29: 539-553. **Wilson, F.**—Some experiments on the influence of environment upon the forms of Aphis chloris (Hemipt.). [36] 87: 165-180, ill.

ARACHNIDA AND MYRIOPODA.—**Cameron, D.**—The northern fowl mite (Liponyssus sylviarum). Investigations at MacDonald College, Que., with a summary of previous work. [Can. Jour. Res.] 16: 230-254, ill. **Chamberlin, J. C.**—New and little-known false scorpions from the Pacific and elsewhere (Chelonethida). [75] 2, 11th Series: p. 259-285, ill. (k*). **Ewing, H. E.**—North American mites of the subfam. Myobiinae. [10] 40: 180-197, ill. (k*). **Grandjean, F.**—Sur quelques caracteres des Acaridiae libres. [Bull. Soc. Zool. France] 62: 388-398, ill. **Jacot, A. P.**—Thomas Say's free-living mites rediscovered. [5] 45: 121-132, ill. (*). **Michelbacher, A. E.**—The biology of the garden centipede Scutigerella immaculata. [Hilgardia] 11: 55-148. **Sellnick, M.**—Eine neue Milbengattung aus Sud- und Mittelamerika. [109] 5: 184-185.

THE SMALLER ORDERS OF INSECTS.—**Babcock & Ewing.**—A n. gen. & sp. of Anoplura from the peccary. [10] 40: 197-201, ill. **Banks, N.**—A n. gen. of Perlidae (Plecoptera). [5] 45: 136-137, ill. **Clay, T.**—The names of some Mallophagan genera. [9] 71: 206-207. **Despax, R.**—Structure de l'organe copulateur male dans le genre Isopteryx Pict. (Chloroperla Newm.) (Plecop.). [25] 43: 135-136. **Folsom & Mills.**—Contribution to the knowledge of the genus Sminthurides. (Collembola). [Bull. Mus. Comp. Zool.] 82: 231-274, ill. **Hood, J. D.**—Nine new Thysanoptera from North America. [Amer. Midl. Nat.] 20: 354-367. Studies in Neotropical Thysanoptera, VII. [105] 9: 218-247, ill. (*). **Lestage, J. A.**—Contribution a l'etude des Ephemeropteres. XXI.—Notes critiques sur l'assimilation

des Polymitarcys aux Ephoron et sur les Polymitarcys palearctiques. [33] 78: 381-394. **Snyder, T. E.**—See under General. **Spieth, H. T.**—Studies on the biology of the Ephemeroptera. I.—Coloration and its relation to seasonal emergence. [4] 70: 210-218. **Ulmer, G.**—Chilenische Ephemeropteren, hauptsachlich aus dem Deutschen Entomologischen Institut Berlin-Dahlem. [109] 5: 85-108, ill.

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HEMIPTERA.—Burham, J. C.—A contribution to a list of the Aphididae of the maritime provinces of Canada [4] 70: 180-188. **Butler, C. G.**—See under Anatomy. **Drake & Harris.**—Concerning Velia boliviana. [105] 9: 97-98, ill. **Hungerford, H. B.**—Some new Graptocorixa from Mexico and other notes. [103] 11: 134-141, ill. **Lindsay, D. R.**—N. spp. of Norvellina (Cicadell.). [103] 11:113-123. **de Long, D. W.**—Biological studies on the leafhopper Empoasca fabae as a bean pest. [U. S. D. A.] Tech. Bull. 618: 1-60, ill. **Strickland, E. H.**—The Chermidae of Alberta. [4] 70: 200-206.

LEPIDOPTERA.—Biedermann, R.—Formes nouvelles des genres Papilio et Prepona. [25] 43: 141-142, (S). **Clarke & Benjamin.**—A study of some N. A. moths allied to the Thyatirid genus Bombycia. [38] 37:55-73, ill. (k*). **Clark & Clark.**—Notes on Virginia butterflies. [95] 51: 177-182. **Comstock & Dammers.**—Notes on the life history of a Noctuid moth. [38] 37: 78-79, ill. **Dethier, V. G.**—The larva and chrysalis of Ancyloxypha numitor (Hesper.). [38] 37: 74-77, ill. **Dos Passos, C. F.**—A new race of Euphydryas chalcedona from Arizona (Nymph.). [4] 70: 199-200, ill. **Field, W. D.**—New forms & subspp. of North American Libytheidae and Lycaenidae. [103] 11: 124-133. **Hall, A.**—On the types of Adelpha (Nymphal) in the collection of the British Museum. [9] 71: 184-187; 208-211; 232-235, (S*). **Mell, R.**—Beitrage zur Fauna sinica. XVII. —Inventur und oekologisches Material zu einer Biologie

der sudchinesischen Lepidopteren. [11] 1938: 197-345, ill. **Nicholson, C.**—Curious behaviour of Danaus chrysippus. [9] 71: 161.

DIPTERA.—Alexander, C. P.—Records & descriptions of Brazilian Tipulidae, Pt. IV. [105] 9: 247-260, (*). See Carpenter under General. **Borgmeier, T.**—Alguns Phorideos myrmecophilos de Costa Rica e do Brasil e quatro especies novas de Melaloncha. [105] 9: 39-53, ill. Phorideos parasitas da formiga argentina. [105] 9: 260-262, (*). **Brauns, A.**—Uber flugelrudimente der Dipterengattung Chionea Dalm (Limnobiid.). [34] 123: 180-184, ill. **da Fonseca, F.**—"Flebotomus limai" [XII Cong. Int. Zool.—Sec. VII—Lisbune] 2: 1497-1498, ill. **Hardy, D. E.**—New Bibionidae from British Columbia. [4] 70: 207-210, ill. **Heiss, E. M.**—A classification of the larvae and puparia of the Syrphidae of Illinois exclusive of Aquatic forms. [Ill. Biol. Monogr.] 16: 3-142, ill. **Hennig, W.**—Zur Frage der verwandschaftlichen Stellung von Braula coeca. [109] 5: 164-174, ill. **Hering, M.**—Neue palaearktischen und exotischen Bohrfliegen. 21. Beitrag zur Kenntnis der Trypetidae. [11] 1938: 397-417, ill. (S*). **Hull, F. M.**—See Carpenter under General. **James, M. T.**—See Carpenter under General. **Jobling, B.**—On two subsp. of Culex pipiens. [36] 87: 193-216, ill. **Macfie, J. W. S.**—Notes on Ceratopogonidae. [107] B. 7: 157-166, ill. (S). **Mathias & Bouchard.**—Sur la biologie d'un diptere des Marais Salants (Ephydra riparia). [Bull. Soc. Zool. France] 62: 421-423. **Mayer, K.**—Ceratopogoniden als Phasmidenparasiten. [105] 9: 13-15, ill. **Prado, A.**—On "Sabethoides intermedius" & "Megarhinus bambusicola" et neiva two species of mosquitoes breeding in bamboo. [XII Cong. Int. Zool. Sec. VII] 2: 1509-1513, ill. **Ronna, A.**—Melaloncha ronnai (Phorid.) endoparasite de Apis mellifica (Abelha domestica) [Rev. Dept. Nac. Produccao Animal Rio de Janeiro] 4: 113-126, ill. **Zumpt, F.**—Vorstudie zu einer monographischen Bearbeitung der Stomoxyinae. Taxonomische Ergebnisse des Studiums einiger Sammlungen besonders der von Bezzi und Enderlein. [65] 25: 337-353, ill.

COLEOPTERA.—Blackman, M. W.—Ancyloderes, a n. gen. of Scolytidae. [10] 40: 204-206. **Blackwelder, R. E.**—Revision of the N. A. beetles of the Staphylinid subfam. Tachyporinae—Pt. 2: Genus Coproporus. [50] 86: 1-10, (k). **Cazier, M. A.**—A generic revision of the N. A.

Cremastocheilini with desc. of a n. sp. (Scarab). [38] 37: 80-87, ill. (k). **Heberdey, R. F.**—Aus der Praxis der Kafersammlers. XXXV. — Das Herstellen microkopischer Praparate. [79] 24: 172-180. **Hustache, A.** — Curculionides nouveaux de l'Amerique meridionale qui se trouvent dans le Deutsches Entomologisches Institut. [109] 5: 174-184. A propose de quelques Curculionides. [25] 43: 160-161, (S). **Kressel, F.**—Das Determinieren in der Coleopterologie und damit zusammenhangende Fragen. [11] 1938: 346-396. **Lameere, A.**—Evolution des Coleopteres. [33] 78: 355-363. **Liebke, M.** — Miscellanea Carabidologica Americana. Pt. II. [105] 9: 206-215, ill. (S). **Mank, E. W.**—A revision of the gen. Zilora (Melandryidae). [5] 45: 101-104, (k*). **Mendes, D.** — Tres especies novas de Cerambycideos do Brasil, dos gen. Lygrocharis, Rhathymoscelis e Alphus. [105] 9: 117-121, ill. **Netolitzky, F.** — Aus der Praxis Kafersammlers. XXIV.—Zur Technik des Sammelns in der Erde lebender Kafer. [79] 24: 95-108. **Ochs, G.** — Additional remarks on West Indian Gyrinidae. [5] 45: 85-93, (*). **Parsons, C. T.** — Notes on N. A. Nitidulidae, II: Cryptarcha. [5] 45: 96-100, ill. (k*). **Pic, M.**—Descriptions de Coleopteres et notes synonymiques. [25] 43: 121-124 (S). **Pringle, J. A.**—A contribution to the knowledge of Micromalthus debilis. [36] 87: 271-286, ill. See under Anatomy. **Reichensperger, A.**—Beitrage zur Kenntnis der Myrmecophilen—und Termitophilen—fauna Brasiliens und Costa Rica (Histerid. & Staphylin.). [105] 9: 74-97, ill. **Sanderson, M. W.**—Elmis columbiensis Angell a synonym cf Zaitzevia parvulus (Horn), (Helmidae). [103] 11: 146. **Saylor, L. W.**—Seven new Neotropical Scarab beetles. [95] 51: 185-190. **Van Dyke, E. C.**—A review of the gen. Scaphinotus, subgen. Scaphinotus (Carab.). [70] 18: 93-133, ill. (k*). **Voss, E.**—Monographie der Rhynchiten—Tribus Rhynchitini. 2.—Gattungsgruppe Rhynchitina. [79] 24: 129-171 (k*).

HYMENOPTERA. — **Benson & Conde.** — Revision der neotropischen Perreyinae (Tenthr.). [105] 9: 121-154, ill. (k*). **Bequaert, J.**—A new Charterginus from Costa Rica with notes on Charterginus, Pseudochartergus, Chartergus, Pseudopolubia, Epipona and Tatua (Vespidae). [105] 9: 99-117, ill. (k*). **Berry, P. A.**—Tetrastichus brevistigma, a pupal parasite of the elm leaf beetle. [U. S. Dept. Agric.] Circ. 485: 1-12, ill. **Bluthgen, P.**—Beitrage zur Kenntnis

der palaearktischen Eumeniden (Vespid.). [11] 1938: 434-495, ill. (k). **Cole, A. C.**—Descriptions of new ants from the western U. S. [Amer. Midland Nat.] 20: 368-373. **Cushman, R. A.**—A n. sp. of Calliephialtes from Brazil with a key to the Neotropical spp. (Ichneum.). [105] 9: 11-13. **Donisthorpe, H.**—Observations on a colony of Acanthomyops (Dendrolasius) fuliginosus for 23 years (Formic.). [21] 50: 73-76. **Farstad, C. W.**—See under Anatomy. **Mequignon, A.**—Une aberation de l'instinct chez un Hymenoptere, Pseudagenia carbonaria (Pompil.). [25] 43: 108-109. **Michener, C. D.**—A review of the American bees of the genus Macropis. [5] 45: 133-135, ill. (k*). **Mickel, C. E.**—A Synopsis of the Mutillid gen. Euspinolia. [105] 9: 53-74 (Sk*). **Mosley, B. D. W.**—An outline of the phylogeny of the Formicidae. [25] 43: 190-194, ill. **Muesebeck, C. F. W.**—Three new reared spp. of Apanteles from California (Bracon.). [10] 40: 201-204. **Osorno & Osorno.**—Notas biologicas sobre algunas especies de Bombus de los alrededores de Bogota, Columbia, Sur America. [105] 9: 31-39, ill. **Pratt, H. D.**—On the synonymy of Orussus sayii Westwood. [5] 45: 94-95. **Schwarz, H. F.**—The stingless bees (Meliponidae) of British Guiana and some related forms. [62] 74: 437-508, ill. (k*). **Thielmann, K.**—Die Nematiden der Larche, eine bionomisch, okologisch forstwirtschaftliche Untersuchung. [65] 25: 169-214, ill. **Vesey-FitzGerald, D.**—Social wasps (Vespidae) from Trinidad, with a note on the genus Trypoxylon (Sphecidae). [36] 87: 181-191, ill. **Weber, N. A.**—The biology of the fungus-growing ants. Pt. IV.—Additional new forms. Pt. V.—The Attini of Bolivia. [105] 9: 154-206, ill.

SPECIAL NOTICES.—Dipteres Dolichopodidae.—L. O. Parent. [Faune de France] 35: 720 pp., ill. (K). **Revision of the Bombyliidae** of Southern Africa. By A. J. Hesse. [Ann. South African Mus.] 34: 1053 pp., ill. (K*).

BULLETIN OF THE CHEYENNE MOUNTAIN MUSEUM, being a catalogue of the original descriptions of the Rhopalocera from north of the Mexican border: Vol. 1, part 1, the Hesperioidea, by Ernest L. Bell, Colorado Springs, Colorado. 35 pages, price 50 cents.

This is the first of a series, others of which are announced as in process of publication. It lists 222 species and 41 races or forms, and is a valuable contribution to our knowledge of the skippers. The number of these insects discovered and named has increased with the years. Skinner's Synonymic Catalog of 1898 listed 182 species and 18 forms, Dyars' Catalog, of 1902, 195 species and 18 forms, the Lindsey, Bell and Williams' Denison University Bulletin of 1931 listed 215 species and 34 forms. The total number however is something less than 10 percent of the Hesperids flying in all the Americas. The nomenclature is the last word in this group, the generic names adopted being those that have strict priority in the literature, and the newer ones that have replaced those that have fallen through previous use elsewhere. All of the references listed, have, to my personal knowledge, been checked by Mr. Bell. The synonymy contains the insects that have been missidentified by authors, so that it may be expected that any figure in the books available to the student may be considered to represent the species unless found corrected in Bell's work. The latter will be found indispensable to all workers interested in the American Hesperioidea. ROSWELL C. WILLIAMS, JR.

THE GENUS SEPTOBASIDIUM. By JOHN N. COUCH. 480 pages, frontispiece, 60 text figures, 114 plates. The University of North Carolina Press. $5.00. Here is a book which, unfortunately, will be reviewed chiefly in purely botanical journals and filed on the botanical shelves in libraries and thus is likely to remain unknown to entomologists unless they come upon it accidentally. But it contains so much of entomological interest that it deserves review in entomological journals and would not be out of place in any entomological library. The reviewer, as a student of the scale insects, has long known that there are some species which are very intimately associated with certain fungi. But not being familiar with the literature of the fungi he was quite unaware of the fact that there is a botanist who is especially interested in this association. It has come, therefore, as a very pleasant surprise to learn that there is such a person and to receive for review an entire volume devoted to the genus *Septobasidium*, to which all the fungus species in question are referred. The pleasure is all the greater, in that the volume is extremely well printed and extremely well illustrated. The extraordinary symbiosis of insect, fungus and host

plant is considered in detail in connection with the fungus, *Septobasidium burtii* Lloyd, which occurs in association with *Diaspidiotus* (= *Aspidiotus*) *osborni* (Newell and Cockerell) on various species of oaks in our southeastern states. In addition a very considerable amount of information obtained from other species associated with other scales on other hosts is added. The story of these relationships is too long even to be abstracted here and the interested student must refer to the book. Dr. Couch points out that all the species of the fungi that he has studied cause damage to their host trees, but that this damage is due "not to the fungus directly but to the combination of fungus and scale insects." The nature of the damage is reviewed and control methods are suggested. A review of the geographical distribution of the host trees and host insects—the latter including two aphids—is presented. The identifications of the scale insects associated with the fungi in North America are by Harold Morrison, but unfortunately in the case of most of the foreign species—which constitute a very large part of the total—the scales are unidentified. The author remarks that "From the results so far obtained it appears that the greater number of species of *Septobasidium* are not limited to an association with one species of scale insect but may be associated with several." A few errors in scale insect names may be noted. *Cerococcus* is mis-spelled as *Cerecoccus* and this generic name is erroneously applied to the species properly to be called *Mycetococcus ehrhorni*. The generic name *Chionaspis* is employed for the species *biclavis* which for more than forty years has been referred to *Howardia*. *Odonaspis* is mis-spelled as *Odanaspis*. Other errors in the list of scales are due merely to the chaotic state of scale insect taxonomy. In the section dealing with the taxonomy of the fungi nearly 175 species, from all parts of the world are listed. That these constitute but a small part of the species which probably exist is emphasized by the author, who points out that except for southeastern United States, no region in the world has been carefully combed for them. A bit of cooperation from those of us who collect scale insects seems to be called for.—G. F. FERRIS.

Erratum. ENTOMOLOGICAL NEWS, vol. xlix, page 262, line 30, for *Biological Extracts*, read *Biological Abstracts*.

Doings of Societies.

The fourteenth annual Rocky Mountain Conference of Entomologists was held at the University of Wyoming summer camp, Centennial, Wyoming, August 14 to 19, 1938. A total of 73, representing 11 states and the District of Columbia, attended. The following are those directly interested in entomology:

Jas. I. Hambleton, F. M. Wadley, Washington, D. C.; Don. B. Whelan, Nebr.; Vasco M. Tanner, Geo. I. Reeves, Utah; Robert Hawkins, Byrne Thrailkill, Wm. B. Owen, C. H. Gilbert, Herbert J. Stoles, Jr., Margaret Greenwald, A. W. Woodrow, Eugene C. Holst, A. P. Sturtevant, Wyoming; Maurice T. James, Bob Potts, C. R. Jones, C. P. Gillette, Theodore R. Hupper, Fred H. Kropf, John L. Hoerner, Theodore R. Robb, Lorin Anderson, Ed Beals, Gordon Mickle, Fred Biederman, Fred R. Lewis, N. D. Wygant, L. G. Davis, Geo. M. List, Ralph J. Gilmore, Miriam A. Palmer, Colorado; Harwood B. Dryer, Richard Lewis Post, New York; R. L. Parker, E. G. Kelly, Roger C. Smith, Kansas; L. H. Shropshire, Wm. P. Hayes, Illinois; Joseph F. Reinhardt, Minnesota; C. L. Farrar, Wisconsin; Paul Knight, Maryland; Ephraim Hixson, Oklahoma.

The following is a list of the more formal subjects discussed:

APICULTURE—The General Research Program of the Intermountain Bee Laboratory, U. S. Bureau of Entomology and Plant Quarantine, Laramie, Wyo., A. W. Woodrow; Resistance of Strains of Bees to American Foul Brood, A. P. Sturtevant; Queen Supersedure, C. L. Farrar.

COLEOPTERA—The Striped Cucumber Beetle on Squash and Melons, J. L. Hoerner; The Wheat White Grub, *Phyllopha lancelata,* E. G. Kelly.

HEMIPTERA—Results in the Control of the Squash Bug, J. L. Horner.

HOMOPTERA—Summer Temperatures and the Tomato Psyllid, *Paratrioza cockerelli* (Sulc), Geo. M. List; Aphid Studies with a Report on Several New Species, Miriam A. Palmer.

LEPIDOPTERA—An Outbreak of the Walnut Datana, 1935-38, Ephraim Hixson; The Celery Stalkworm, *Nomophila noctuella,* Roger C. Smith; Biology and Control of the Strawberry Leafroller, *Ancylis comptana* Froel, R. L. Parker.

ORTHOPTERA — Grasshopper Control Studies; Roger C. Smith; Symposium, The 1938 Grasshopper Program, C. L. Corkins. Discussed by T. R. Robb, Gordon Mickle, Ed Beals,

Fred R. Lewis, Fred Biederman, Fred H. Kropf, T. R. Hupper, Robert Hawkins.

GENERAL—Symposium, The Building of Insect Collections Representative of the Inter-mountain Region; Leaders: Robert Potts, Vasco M. Tanner, Maurice T. James, Don B. Whelan, Roger C. Smith; Preserving Insect Specimens and Preparing Material for Display, R. L. Post; The Castor Bean in Relation to Insects, Roger C. Smith; Effect of Fumigation on Tomato Fruit, C. R. Jones; Insect Control on Truck Crops in Northern Illinois, L. H. Shropshire; Insect Problems in Wyoming, Margaret Greenwald; Some Work of the Nebraska Station, Don B. Whelan; Statistical Methods in Entomology, F. M. Wadley; Bacteriological Work at the Intermountain Bee Laboratory, Herbert J. Stoles, Jr.; Some Problems Being Studied at the Forest Insect Laboratory of the U. S. Bureau of Entomology and Plant Quarantine, N. D. Wygant; Insect Photography for Class Room Use, Paul Knight.

It was voted to attempt to make discussions of forest and shade tree pests a main part of the program in 1939, and if practical to arrange for trips into the surrounding national forests to study the forest insect research programs.

The officers elected for 1939 were C. P. Gillette, Chairman; Vasco M. Tanner, Vice-Chairman; George M. List, Secretary, and C. R. Jones, Treasurer. GEORGE M. LIST, Secretary, Rocky Mountain Conference of Entomologists.

Dr. Eugene Murray-Aaron Convalescing.

It may interest those who remember Dr. Eugene Murray-Aaron as a lepidopterist, who began writing for entomological journals in 1874, to realize from our October number that he is still actively interested and busy at work in the Field Museum, in Chicago. Just now he is convalescing in a hospital from a broken leg due to the speed fever of a careless autoist, and the 86-year bones are successfully knitting together.

He is working on a catalog of the North American Rhopalocera, after the pattern of, and to supplement that of, Skinner, forty years ago, but to be supplied with tables, keys, line and photo illustrations to aid the student in specific identification. His friends will hope his rather unusual physical resiliency may stay with him as long as his mental energy requires.

INDEX TO VOLUME XLIX

(* indicates new genera, species, names, etc.)

AHRENS, C. A list of dragonflies taken during the summer of 1936 in western United States 9
A list of dragonflies taken in southern Alaska 225
ANON. Dr. Eugene Murray-Aaron convalescing 300
ANON. Obituary: Vernon Lyman Kellogg 197
BARBER, G. W. The concentration of Heliothis obsoleta moths at food 256
BEEKEY, C. E. The immature and adult stages of a new species of Scatopse from Maine 151
BENESH, B. Descriptions of some new forms of Pseudolucanus capreolus 271
BEQUAERT, J. Notes on Hippoboscidae: 11. Additional notes on Pseudolynchia 41
BYERS, C. F. Some dragonflies from the Florida Keys.. 163
CALVERT, P. P. Biological Abstracts 262
Obituary: George Henry Falkiner Nuttall..... 80
On the designation of Generotypes by Fabricius 239
New records of Odonata for southeastern Pennsylvania 251
Review: A Glossary of Entomology 59
Review: The male genitalia of orthopteroid insects.... 90
Review: Recent advances in entomology 209
CARTWRIGHT, O. L. A South African Onthophagus found in the United States 114
CHAMBERLIN, R. V. Three new geophiloid Chilopods.... 254
CLAYTON, W. J. Description of and notes on the early stages of Hyloicus canadensis 69
COCKERELL, T. D. A. An old joke about bees 231
COOPER, R. H. A breeding record for the red-barred sulphur from Indiana 261
COMSTOCK, J. A. A New Check List of the Macrolepidoptera of Canada and the United States of America..... 149
CRESSON, E. T., JR. Descriptions of some North American Micropezidae 72

Review: Procedure in taxonomy 89
Review: Source book of biological terms 89
(See Pate, Mackey and Cresson.)
DAVIS, E. M. Notes on Florida Odonata 223
DAVIS, E. M. & FLUNO, E., M. Odonata at Winter Park, Florida 44
DELEON, D. Notes on the distribution of Vermileo in the United States and Mexico with a description of a new species 167
DODGE, H. R. Coccidula suturalis synonymy 221
EVANS, C. A. Migration of monarch butterflies 287
FERRIS, G. F. Review: The genus Septobasidium (Botany) 297
FIELD, W. D. A new butterfly record for the United States 28
FLUNO, J. A. (See Davis and Fluno.)
FOX, H. The occurrence of Nemobius sparsalsus in Southern New Jersey 133
FRANCLEMONT, J. G. Descriptions of new melaniforms .. 108
GLOYD, L. K. Notes on some dragonflies from Admiralty Island, Alaska 198
HARMSTON, F. C. (See Knowlton & Harmston.)
HATCH, M. H. Two new species of Helmidae from a warm spring in Montana 16
HAYES, W. P. A bibliography of keys for the identification of immature insects. Part 1. Diptera 246
HEBARD, M. Where and when to find the orthoptera of Pennsylvania, with notes on the species which in distribution reach nearest this state 33, 97, 155
(See Rehn and Hebard.)
HOVANITZ, W. The interpretation of the term subspecies and the status of names applied to lower categories in lepidoptera 39
JAMES, M. T. Notes on some North American Mydaidae 63
KASTON, B. J. A note on synonymy in spiders 258
KNOWLTON, G. F. & HARMSTON, F. C. Notes on Utah Plecoptera and Trichoptera 284

KNOWLTON, G. F., & SMITH, C. F. Notes on western conifer aphids 65
KNULL, J. N. Four new coleoptera 19
A new Acmaeodera 228
KROMBEIN, K. V. Corrections and additions to a recent Catalog of the Tiphiidae 184
Further observations on the nesting habits of Cerceris nigrescens 1
LANDIS, B. J., & MASON, H. C. Variant elytral markings of Epilachna varivestis 181
LEUSSLER, R. A. An annotated list of the butterflies of Nebraska, with the description of a new species, 3, 76, 213, 275
LINSLEY, E. G. Notes on the synonymy and distribution of some North American bees of the genus Bombomelecta 160
LIST, G. M. Rocky Mountain Conference of Entomologists 210
MACKEY, LAURA S. (See Pate, Mackey and Cresson.)
MALOEUF. Flashing of fireflies 261
MCCLURE, H. E. Some insects accepted by the American Chameleon, Anolis carolinensis 252
Where to collect insects? 138
MASON, H. C. (See Landis and Mason.)
MICHENER, C. D. The bees of the genera Chelostomopsis, Formicapis, Robertsonella and Prochelostoma 127
MURRAY-AARON, E. Egg-laying among the Argynnids .. 229
O'BYRNE, H. L. An unusual nesting site of Polistes rubiginosus 288
PATE, V. S. L., MACKEY, LAURA S., AND CRESSON, E. T., JR. Current Entomological Literature: 23, 54, 81, 116, 144, 172, 201, 232, 263, 290.
PLETSCH, D. J. An outbreak of Synnoma lynosyrana... 231
REES, B. E. An improved method of bleaching insect specimens 195
REHN, J. A. G. Supella supellectilium in Pennsylvania.. 143
REHN, J. A. G., & HEBARD, M. A substitute name for

Dicellura 150
REHN, J. W. H. Notes on the eggpods of Appalachia hebardi and Dendrotettix quercus 259
REINHARD, E. G. The egg-laying and early stages of the robber-fly, Erax aestuans 281
RICHARDS, A. G., JR. The remarkable setae on the male genitalia of the North American species of the genus Amyna 91
ROBINSON, M. Two unusual collecting records for Pennsylvania 103
Ross, E. S. New North American Histeridae 48
SCHMIEDER, R. G. Review: Genetics and the origin of species 88
Review: Mosaics and other anomalies among ants 208
SMITH, C. F. (See Knowlton & Smith.)
SNODGRASS, R. E. Review: Grundriss der Insektenkunde 269
SPIETH, H. T. A method of rearing Hexagenia nymphs 29
TOWNES, H. K., JR. Ichneumon hibernation in the northeastern United States 219
TOWNSEND, C. H. T. Five new genera of fossil Oestromuscaria 166
TUTHILL, L. D. Some new North American Psyllidae .. 241
VAN DYKE, E. C. New species of Pacific Coast Coleoptera 189
WILLIAMS, J. L. The mating of Ephestia kuehniella and its results 104, 121
WILLIAMS, R. C. Review: A catalogue of the original descriptions of the Rhopalocera from north of the Mexican border. Hesperioidea 296
WORTH, C. B. The first occurrence of Sphinx franckii in Pennsylvania 230
Two Philosamia cynthia pupae in one cocoon 61
WYATT, A. K. Hemileuca maia in flight 211
YOUNG, F. M. Some interesting butterfly records for South Florida 115

GENERAL SUBJECTS

Biological Abstracts 262
Bird Hosts 42
Bleaching insect specimens, Improved method 195
Chameleon, Insects accepted by 252
Collect, Where to 138
Convocation Week Meetings.. 52
Current Entomological Literature: 23, 54, 81, 116, 144, 172, 201, 232, 263, 290.
Ectoparasite of Animals 41
Food, Insects used for 1
Fungus, Insects of 297
Generotypes by Fabricius, Designation of 239
Host, Insects 48, 106, 169
Hosts, Plants (See Plant Hosts)
Lizards, Insects prey of 252
Naturalists' Directory 180
New Check List of the Macrolepidoptera of Canada and the United States of America 149
Plant hosts: 6, 33, 66, 70, 97, 104, 128, 134, 155, 161, 190, 212, 220, 231, 246, 256, 281.
Rocky Mountain Conference of Entomologists 210, 299

OBITUARY NOTICES

Cassino, S. L. 180
Kellogg, V. L. 197
Nuttall, G. H. F. 80

PERSONALS

Aaron, E. M. 300
Say, Thomas, Anniversary of his birth 28
Snodgrass, R. E. 47

REVIEWS

Bell: Catalogue of original descriptions of the Hesperioidea north of Mexico 296
Couch: The genus Septobasidium (Botany) 297
Dobzhansky: Genetics and the origin of species 88
Imms: Recent advances in entomology 209
Melander: Source book of biological terms 89
Schenk & McMasters: Procedure in taxonomy 89
Snodgrass: The male genitalia of orthopteroid insects..... 90
de la Torre-Bueno: A Glossary of entomology 59
Weber: Grundriss der insektenkunde 269
Wheeler: Mosaics and other anomalies among ants 208

GEOGRAPHICAL DISTRIBUTION

Arizona: Col. 21, 22, 48, 228; Dipt. 73; Hem. 242; Hym. 160; Lep. 231; Orth. 143. Odon. (see Ahrens).
California: Col. 50, 190, 228; Dip. 63, 167; Hym. 128, 160; Lep. 40, 231. Odon. (see Ahrens).
Colorado: Dip. 64, 166; Hem. 65, 69, 243; Hym. 130, 160; Lep. 231.
Connecticut: Orth 156
Delaware: Orth. 156
District of Columbia: Dipt. 76; Hym. 132; Orth. 156.
Florida: Hem. 244; Lep. (see Young); Odon. (see Byers, also Davis, also Davis & Fluno); Orth. 133.
Georgia: Col. 114; Hym. 132; Lep. 94, 256.

Idaho: Hom. Odon. (see Ahrens). 65
Illinois: Col. 272; Dipt. 281; Hym. 131, 132, 289; Lep. 261; Orth. 143.
Indiana: Hym. 132; Lep. 211, 261; Neur. 30; Orth. 143.
Kansas: Orth. 143
Maine: Col. 222; Dipt. 151; Lep. 69, (see Leussler); Orth. 159.
Maryland: Col. 274; Hym. 132; Orth. 156.
Massachusetts: Col. 274; Hym. 130; Orth. 158.
Michigan: Hym. 132; Lep. .. 287
Minnesota: Dipt. 42
Missouri: Lep. 261; Orth.... 143
Montana: Col. 16; Hom. 65; Lep. 231.
Nebraska: Lep. (see Leussler); Orth. 143.
Nevada: Dipt. 168; Hom. 242; Hym. 160.
New Jersey: Orth. 133, 157
New Mexico: Dipt. 168; Hym. 160; Lep. 231. Odon. (see Ahrens).
New York: Hym. 1, 132; Lep. 108; Orth. 157.
North Carolina: Hym. 131; Orth. 133.
Ohio: Col. 21, 182; Dipt. 42; Hym. 132; Orth. 156.
Oklahoma: Odon. (see Ahrens).
Oregon: Hom. 68, 242; Hym. 129, 160; Myriapoda 254.
Pennsylvania: Col. 274, (see Robinson); Dipt. 76; Hym. 132; Lep. 61, 230; Odon., (see Calvert); Orth. 133, 143, (see Hebard).
Tennessee: Col. 271-4; Hym. 288; Lep. 229.
Texas: Col. 19; Dipt. 76; Hym. 131, 161; Lep. 28, 261; Myriapoda 254; Orth. 133.
Utah: Dipt. 75, 168; Hom. 65; Hym. 160; Neur., (see Knowlton & Harmston). Odon. (see Ahrens).
Virginia: Hym. 132; Orth.... 156
Washington: Hym. 128
Wisconsin: Lep. 287
Wyoming: Hom. 65
Alaska: Hym. 129; Odon., (see Ahrens, also Gloyd).
Canada: Col. 51; Hym. 130, 160
Central America: 261
Mexico: Col. 182; Dipt. 171; Lep. 261.
South America: Lep. 261

COLEOPTERA

Acamaeodera (see *vulturei*)
antirrhini, Gymnetron 2
Aphodius (see *leptotarsis*)
aridis, Glyptoscelis* 194
arizonensis, Terapus* 48
bicornus, Bostricholclerus* ... 190
*Bostrichoclerus** 189
(see *bicornus*)
browni, Conoderus* 19
browni, Heterelmis* 16
Buprestidae 19, 228
californica, Ischalia* 192
capreolus, Pseudolucanus 271
Chrysomelidae 189
Cleridae 189
Coccidula (see *occidentalis, reitteri, suturalis*)
Coccinellidae 181
Conoderus (see *browni*)
costa, Ischalia 193
delumbis, Hyperodes 3
depressus, Onthophagus* 114
dietrichi, Hetaerius 50
Elateridae 19

Elytral markings in Epilachna 181
Enoclerus (see *humeralis, inyoensis, lecontei*)
Epilachna (see *varivestis*)
Eupleurida 193
flavomarginatus, Limonius* .. 20
Flashing of fireflies 261
glabratus, Macronychus 19
Glyptoscelis (see *aridis, illustris*)
Gymnetron (see *antirrhini*)
Helmidae 16
Hetaerius (see *dietrichi, wagneri, wheeleri*)
Heterelmis (see *browni*)
hispidula, Sitona 1
Histeridae 48
humeralis, Enoclerus 191
Hyperodes (see *delumbis*)
illustris, Glyptoscelis 194
infernalis, Terapus 49
inyoensis, Enoclerus* 191
Ischalia (see *californica, costa, patagiata, vancouverensis*)
lecontei, Enoclerus 191
leptotarsis, Aphodius 103
liebecki, Odontaeus 104
Limonius (see *flavomarginatus*)
Lucanidae 271
Macronychus (see *glabratus, parvulus, thermae*)
musculus, Ochodaeus 104
muticus, Pseudolucanus 274
nigricephalus, Pseudolucanus*. 273
Ochodaeus (see *musculus, liebecki*)
occidentalis, Coccidula 222
Onthophagus (see *depressus*)
Paratyndaris (see *quadrinotata, tucsoni*)
parvulus, Macronychus 18
patagiata, Ischalia 193
Plegaderas (see *setulosus*)
Pseudolucanus (see *capreolus, muticus, nigricephalus*)
Pyrochroidae 189
quadrinotata, Paratyndaris* .. 22
reitteri, Coccidula* 222
Scarabaeidae 103, 114
Scarabaeus (see *Pseudolucanus*)
setulosus, Plegaderas* 50
Sitona (see *hispidula*)
suturalis, Coccidula 221
Synonymy in Coccidula 221
Terapus (see *arizonensis, infernalis*)
thermae, Macronychus* 18
tucsoni, Paratyndaris* 21
vancouverensis, Ischalia 193
varivestis, Epilachna 181
vulturei, Acamaeodera* 228
wagneri, Hetaerius* 49
wheeleri, Hetaerius 50

DIPTERA

abnormis, Micropeza* 72
*Adipterites** 166
aestuans, Erax 281
armatipes, Glossina 166
Arthrostylum (see *fascipennis*)
atra, Micropeza* 74
atrata, Scatopse 154
Asilidae 281
Bibliography for immature insects. Diptera 246
brunnea, Pseudolynchia 42
brunneipes, Taeniaptera* 76
brusei, Phyllomydas 64
canariensis, Pseudolynchia ... 42
*Cockerellitha** 166
compar, Micropeza* 73
comstocki, Vermileo 167
concinna, Nomoneura 64
Dipterites (see *obovatus*)
Early stages of Erax 281
Egg-laying of Erax 281

*Electrotachina** 166
(see *smithii*)
fascipennis, Arthrostylum 169
Erax (see *aestuans*)
Fossil Oestromuscaria 166
Glossina (see *armatipes, osborni*)
Hippoboscidae, Notes on 41
hirta, Nomoneura 64
Immature stages, Bibliography of 246
*Lithoglossina** 166
micheneri, Nomoneura* 63
Micropeza (see *abnormis, atra, compar, setaventris, texana*)
Micropezidae 72
Musca (see *vinculata*)
Mydaidae, Notes on 63
Nomoneura (see *concinna, hirta, micheneri, venosa*)
obovatus, Dipterites 166
opacus, Vermileo 168
osborni, Glossina 166
Pheneus (see *tibialis*)
Phyllomydas (see *brusei*)
Pseudolynchia, Notes on 41
(see *brunnea, canariensis, rufipes*)
pygmaea, Scatopse 154
Rhagionidae 167
rufipes, Pseudolynchia 43
Scatopse (see *atrata, pygmaea, similis, subnitens*)
Senotainia (see *trilineata*)
*setaventris**, *Micropeza* 74
*similis**, *Scatopse* 151
*smithii**, *Electrotachina* 166
subnitens, Scatopse 151
Scatopsidae 151
Taeniaptera (see *brunneipes*)
*texana**, *Micropeza* 75
tibialis, Pheneus 169
trilineata, Senotainia 2
venosa, Nomoneura 64
Vermileo, Distribution of..... 167
(see *comstocki, opacus, willetti*)
vinculata, Musca 166
*Vinculomusca** 166
*willetti**, *Vermileo* 170

HEMIPTERA

Aphididae 65
Arytaina (see *hirsuta*)
brevispinosa, Cinara 65
*chlora**, *Trioza* 244
Cinara (see *brevispinosa, curvipes, ferrisi, glehna, hottesi, medispinosa, murrayanae, occidentalis, pini, ponderosae, sibiricae, taxifoliae, thatcheri, utahensis, zoolathridi*)
curvipes, Cinara 65
Essigella (see *fusca*)
ferrisi, Cinara 65
Fungus, Coccids associated with 297
fusca, Essigella 69
glehna, Cinara 65
*hirsuta**, *Arytaina* 241
hottesi, Cinara 65
Levidea (see *lineata*)
*lineata**, *Levidea* 245
medispinosa, Cinara 65
murrayanae, Cinara 65
*nana**, *Psylla* 242
occidentalis, Cinara 65
pini, Cinara 65
pini-radiatae, Schizolachnus... 68
ponderosae, Cinara 65
Psylla (see *nana*)
Rhinopsylla (see *schwarzi*)
Schizolachnus (see *pini-radiatae*)
schwarzi, Rhinopsylla 244
*shepherdiae**, *Trioza* 243
sibiricae, Cinara 66
taxifoliae, Cinara 66
*thatcheri**, *Cinara* 66

Trioza (see *chlora, shepherdiae*)
*utahensis**, *Cinara* 66
*zoolathridi**, *Cinara* 68

HYMENOPTERA

abdominalis, Tiphia 187
alleni, Tiphia 185
annulata, Tiphia 187
australis, Chelostoma 127
azygos, Bombomelecta 161
bipunctata, Tiphia 187
Bombomelecta (see *azygos, edwardsi, fulvida, larreae, maculata, pacifica*)
Synonymy and distribution. 160
brevicornis, Tiphia 187
brevilineata, Tiphia 185
canadensis, Ichneumon 220
canaliculata, Epomidiopteron. 185
canaliculata, Paratiphia 185
canaliculata, Tiphia 185
caroliniana, Tiphia 187
ceanothi, Chelostomopsis 127
ceanothi, Raphidostoma 128
cenoptera, Tiphia 187
centrator, Ichneumon 220
Cerceris (see *nigrescens*)
Chelostoma (see *australis, lutzi, neomexicana*)
Chelostomopsis 127
(see *ceanothi, edwardsii, rubifloris*)
ciliata, Tiphia 187
cincticornis, Ichneumon 220
cingulata, Tiphia 187
clypeata, Formicapis 129
collaris, Tiphia 188
confirmatus, Ichneumon 220
crassicornis, Tiphia 188
crataegina, Robertsonella 131
denticula, Tiphia 185
devinctor, Ichneumon 220
dorsata, Tiphia 188
12-maculata, Epomidiopteron.. 186
edwardsi, Bombomelecta 161
edwardsii, Chelostomopsis 127
ephippium, Tiphia 188
Epomidiopteron (see *canaliculata, 12-maculata, heterospilum*)
exitalis, Tiphia 186
flavipes, Tiphia 188
Formicapis (see *clypeata, neomexicana*)
fortistriolata, Tiphia 185
fulvida, Bombomelecta 160
funestus, Ichneumon 220
fuscifrons Ichneumon 220
gleasoni, Robertsonella 131
grossa, Tiphia 188
Habrobracon (see *juglandis*)
haemorrhoidalis, Tiphia 188
hemiptera, Tiphia 188
heterocampae, Ichneumon 220
heterospilum, Epomidiopteron. 185
Hibernation of Ichneumon ... 219
histrionica, Tiphia 188
Ichneumon (see *canadensis, centrator, cincticornis, confirmatus, devinctor, funestus, fuscifrons, heterocampae, leucaniae, scelestus, ultimus*)
Ichneumonidae 219
inornata, Tiphia 186
intermedia, Tiphia 186
interrupta, Tiphia 188
Joke about bees 231
juglandis, Habrobracon 106
larreae, Bombomelecta 161
Levidea (see *lineata*) 245
leucaniae, Ichneumon 220
lutzi, Chelostoma 127
maculata, Bombomelecta 161
maculata, Tiphia 188
marginata, Tiphia 188
Megachilidae 127
minutopunctata, Tiphia 186

mixta, Tiphia 188
neomexicana, Chelostoma 129
neomexicana, Formicapis 129
Nesting habits of Cerceris.... 1
Nesting of Vespa 288
nigra, Tiphia 188
nigrescens, Cerceris 1
obscura, Tiphia 188
pacifica, Bombomelecta 160
palmi, Tiphia 187
Paratiphia (see *canaliculata*)
philadelphi, Prochelostoma ... 132
Polistes (see *rubiginosus*)
Prey of Cerceris 1
Prochelostoma 131
(see *philadelphia*)
punctata, Tiphia 186
quinquecincta, Tiphia 188
radula, Tiphia 188
reticulata, Tiphia 186
Raphidostoma (see *Chelostomopsis*)
Robertsonella 130
(see *crataegina, gleasoni, simplex*)
rubifloris, Chelostomopsis 127
rubiginosus, Polistes 288
ruficornis, Tiphia 188
rufiventris, Tiphia 188
scelestus, Ichneumon 220
Scoliphia (see *spilota*)
serena, Tiphia 188
simplex, Robertsonella 130
Sphecidae 1
spilota, Scoliphia 185
thoracica, Tiphia 189
Tiphia (see *abdominalis, alleni, annulata, bipunctata, brevicornis, brevilineata, canaliculata, caroliniana, cenoptera, ciliata, cingulata, collaris, crassicornis, denticula, dorsata, ephippium, exitalis, flavipes, fortistriolata, grossa, haemorrhoidalis, hemiptera, histrionica, inornata, intermedia, interrupta, maculata, marginata, minutopunctata, mixta, nigra, obscura, palmi, punctata, quinquecincta, radula, recticulata, ruficornis, rufiventris, serena, thoracica, tricincta, trifasciata, tripuncata, turneri, unicolor, variegata*)
Tiphiidae, Corrections and additions 184
tricincta, Tiphia 189
trifasciata, Tiphia 189
tripunctata, Tiphia 189
turneri, Tiphia* 187
ultimus, Ichneumon 220
unicolor, Tiphia 185
variegata, Tiphia 189
Vespidae 288

LEPIDOPTERA

acadica, Strymon 276
acastus, Melitaea 216
acmon, Plebejus 278
Acronicta (see *atrior, columboides, percolens, scintillans, superba*)
adippe, Argynnis 40
adjutrix, Chlosyne 218
afranius, Erynnis 280
agarithe, Catopsilia 77
Aglais (see *antiopa, j-album, milberti*)
ajax, Papilio 6
alcestis, Argynnis 215
amphidusa, Eurymus 79
ampliata, Papilio 6
Amynthia (see *clorinde, maerula*)
Amyna (see *bullula, octo*)
Anaea (see *andria, phithyusa*)
Ancloxypha (see *numitor*)

andria, Anaea 276
Anteos (see *maerula*)
Anthanassa (see *texana*)
Anthocaris (see *medea*)
anthyale, Eurymus 79
antiopa, Aglais 275
aphrodite, Argynnis 215
Appias (see *neumoegenii*)
archippus, Basilarchia 275
Arctiidae 108
Argynnis (see *adippe, alcestis, aphrodite, bellona, cybele, cypris, diana, edwardsii, halcyone, hesperis, idalia, interligata, meadii, myrina, niobe, platina*)
arthemis, Basilarchia 275
Ascia (see *protodice, rapae, sisymbrii, vernalis*)
atalanta, Cynthia 275
atrior, Acronicta* 112
bachmanii, Libythea 276
Basilarchia (see *archippus, arthemis, weidemeyerii*)
batesi, Phyciodes 217
bellona, Argynnis 229
bellona, Brenthis 216
berenice, Danaus 213
bernadetta, Euphydryas 216
Brenthis (see *bellona, myrina*)
Brephidium (see *exilis*)
brizo, Erynnis 279
brucei, Papilio 7
bullula, Amyna 92
caesonia, Zerene 78
calanus, Strymon 276
Callidryas (see *philea*)
canadensis, Hyloicus 69
cardui, Cynthia 275
Catocala (see *forbesi, krombeini, mildredae, ruperti*)
Catopsilia (see *agarithe, pallida, philea, sennae*)
catullus, Pholisora 279
Celtiphaga (see *celtis, clyton, inornata*)
celtis, Celtiphaga 275
Cercyonis (see *meadii, oetus, olympus*)
Chaerephon (see *rhesus, simius*)
chersis, Hyloicus 70
Chlosyne (see *adjutrix*)
claudia, Euptoieta 215
clorinde, Amynthia 77
clyton, Celtiphaga 276
coenia, Junonia 275
Coenonympha (see *inornata, ochracea*)
Colaenis (see *julia*)
coloradensis, Euchloe 76
columboides, Acronicta* 113
comma, Polygonia 218
comyntas, Everes 278
comyntas, Lycaena 230
cresphontes, Papilio 7
curvifascia, Papilio 6
cybele, Argynnis 215, 229
cymela, Megisto 213
Cynthia (see *atalanta, cardui, virginiensis*)
cynthia, Philosamia 61
cypris, Argynnis 215
Danaida (see *plexippus*)
Danaidae 287
Danaus (see *berenice, menippe*)
danaus, Thorybes 279
deplorans, Phigalia* 108
diana, Argynnis 229
Dione (see *vanillae*)
dione, Lycaena 277
dryas, Polygonia 218
Early stages of Hyloicus 69
editha, Euphydryas 40
edwardsii, Argynnis 216
edwardsii, Eurymus 40, 80
edwardsii, Strymon 276

Enodia (see *portlandia*)
Epargyreus (see *tityrus*)
Ephestia (see *kuehniella*)
Erynnis (see *afranius, brizo, funeralis, horatius, juvenalis, lucilius, martialis, persius*)
eryphon, Incisalia 277
Euchloe (see *coloradensis*)
Euphydryas (see *bernadetta, editha, fieldi, wrighti*)
Euptoieta (see *claudia*)
Eurema (see *lisa, mexicana, nicippe*)
eurydice, Satyrodes 213
Eurymus (see *amphidusa, anthyale, edwardsii, eurytheme, hatui, philodice*)
eurytheme, Eurymus 79
Everes (see *comyntas, herii*)
exilis, Brephidium 278
fabricii, Polygonia 218
Feniseca (see *tarquinius*)
fieldi, Euphydryas 40
Flight of Hemileuca 211
Food, Moths at 256
forbesi, Catocala* 110
franckii, Sphinx 230
fumosus, Satyrodes 213
funeralis, Erynnis 280
garita, Oarisma 280
Genitalia of Amyna 91
Geometridae 108
Glaucopsyche (see *lygdamus*)
glaucus, Papilio 7
halcyone, Argynnis 216
Haploa (see *suffusca*)
hatui, Eurymus 40
hayhurstii, Pholisora 279
Heliothis (see *obsoleta*)
helloides, Lycaena 277
Hemiargus (see *isola*)
Hemileuca (see *maia*)
henrici, Incisalia 277
herii, Everes 278
Hesperia (see *pahaska, uncas*)
hesperis, Argynnis 216
horatius, Erynnis 280
Hyloicus (see *canadensis, chersis*)
Hypolimnas (see *misippus*)
hypophlaeas, Lycaena 277
idalia, Argynnis 215, 230
immaculsecunda, Zerene 79
Incisalia (see *eryphon, henrici*)
inornata, Celtiphaga 276
inornata, Coenonympha 213
interligata, Argynnis 40
interrogationis, Polygonia 218
iole, Nathalis 9
ismeria, Phyciodes 217
isola, Hemiargus 278
j-album, Aglais 275
julia, Colaenis 214
Junonia (see *coenia*)
juvenalis, Erynnis 280
Kricogonia (see *lyside*)
krombeini, Catocala* 110
kuehniella, Ephestia 104
Lasiocampa (see *quercus*)
lecontei, Papilio 8
Leptotes (see *marina*)
Libythea (see *bachmanii*)
liparops, Strymon 277
lisa, Eurema 80
lucilius, Erynnis 280
Lycaena (see *comyntas, dione, helloides, hypophlaeas, rubidus, thoe*)
Lycaenopsis (see *neglecta, pseudargiolus*)
lycea, Plebejus 278
lygdamus, Glaucopsyche 279
lynosyrana, Synnoma 231
lyside, Kricogonia 115
maerula, Amynthia 77
maerula, Anteos 115
maia, Hemileuca 211
marcia, Phyciodes 217

marina, Leptotes 278
martialis, Erynnis 280
Mating of Euphestia 104
meadii, Argynnis 216
meadii, Cercyonis 214
medea, Anthocaris 77
Megisto (see *cymela*)
melinus, Strymon 276
melissa, Plebejus 278
Melitaea (see *acastus, pola*)
menapia, Neophasia 8
menippe, Danaus 80
mexicana, Eurema 80
Migration of Danaida plexippus 287
milberti, Aglais 275
mildredae, Catocala* 111
minnehaha, Plebejus 278
misippus, Hypolimnas 115
Mitoura (see *siva*)
multicaudata, Papilio 7
myrina, Argynnis 229
myrina, Brenthis 216
Nathalis (see *iole*)
neglecta, Lycaenopsis 279
Neominois (see *ridingsi*)
Neophasia (see *menapia*)
neumoegenii, Appias 8
nicippe, Eurema 80
niobe, Argynnis 40
Noctuidae 91, 108, 256
numitor, Ancloxypha 280
nycteis, Phyciodes 217
Nymphalidae 229
Oarisma (see *garita*)
obsoleta, Heliothis 256
ochracea, Coenonympha 213
octo, Amyna 91
Oeneis (see *varuna*)
oetus, Cercyonis 214
olympus, Cercyonis 214
pahaska, Hesperia* 5
palamedes, Papilio 8
pallida, Catopsilia 77
palumbes, Venusia* 108
Papilio (see *ajax, ampliata, brucei, cresphontes, curvifascia, glaucus, lecontei, multicaudata, palamedes, philenor, telamonides, troilus, turnus*)
Parnassius (see *sayii*)
percolens, Acronicta* 112
persius, Erynnis 279
Phaedrotes (see *piasus*)
Phigalia (see *deplorans*)
philea, Callidryas 261
philea, Catopsilia 77, 261
philenor, Papilio 6
philodice, Eurymus 79
Philosamia (see *cynthia*)
phithyusa, Anaea 28
Pholisora (see *catullus, hayhurstii*)
Phyciodes (see *batesi, ismeria, marcia, nycteis, picta, tharos*)
Physiology of Ephestia 121
piasus, Phaedrotes 279
picta, Phyciodes 217
Pieridae 261
platina, Argynnis 216
Plebejus (see *acmon, lycea, melissa, minnehaha*)
plexippus, Danaida 287
pola, Melitaea 217
Polygonia (see *comma, dryas, fabricii, interrogationis, progne, satyrus, zephyrus*)
polyphemus, Telea 105
portlandia, Enodia 213
progne, Polygonia 218
protodice, Ascia 9
pseudargiolus, Lycaenopsis ... 279
Pupae of Philosamia 61
pylades, Thorybes 279
Pyrgus (see *scriptura, tessellata*)
quercus, Lasiocampa 104
rapae, Ascia 9

Record, Butterfly 28
rhesus, Chaerephon 280
ridingsi, Neominois 213
rosa, Zegris 76
rosa, Zerene 78
rubidus, Lycaena 277
ruperti, Catocala* 109
Saturniidae 61, 211
Satyrodes (see *eurydice, fumosus*)
satyrus, Polygonia 218
sayii, Parnassius 8
scintillans, Acronicta* 113
scriptura, Pyrgus 279
sennae, Catopsilia 77
simius, Chaerephon 280
sisymbrii, Ascia 9
siva, Mitoura 277
Sphingidae 69, 230
Sphinx (see *franckii*)
Status of names 39
Strymon (see *acadica, calanus, edwardsii, liparops, titus, melinus*)
stygia, Vitrinella* 109
Subspecies and the status of names 39
suffusca, Haploa* 114
superba, Acronicta* 112
Synnoma (see *lynosyrana*)
tarquinius, Feniseca 277
telamonides, Papilio 8
Telea (see *polyphemus*)
tessellata, Pyrgus 279
texana, Anthanassa 218
tharos, Phyciodes 217
thoe, Lycaena 277
Thorybes (see *daunus, pylades*)
titus, Strymon 276
tityrus, Epargyreus 279
Tortricidae 231
troilus, Papilio 8
turnus, Papilio 7
uncas, Hesperia 280
vanillae, Dione 215
varuna, Oeneis 214
Venusia (see *palumbes*)
vernalis, Ascia 9
virginiensis, Cynthia 275
Vitrinella (see *stygia*)
weidemeyerii, Basilarchia 275
wrighti, Euphydryas 40
Zegris (see *rosa*)
zephyrus, Polygonia 218
Zerene (see *caesonia, immaculsecunda, rosa*)

NEUROPTERA

bilineata, Hexagenia 29
Ephemera (see *simulans*)
Hexagenia (see *bilineata, occulta*)
occulta, Hexagenia 29
Plecoptera of Utah, Notes on 284
Rearing Hexagenia nymphs .. 29
simulans, Ephemera 29
Trichoptera of Utah, Notes on 284

ODONATA

Aeschna (see *eremita, interrupta, juncea, lineata, multicolor, nevadensis, palmata, sitchensis, verticalis, walkeri, walsinghami*)
Aeshna (see *Aeschna*)
Agrion (see *resolutum*)
albicincta, Somatochlora 226
amazili, Anax 164
Anax (see *amazili, junius*)
Anomalagrion (see *hastatum*)
antilope, Gomphaeschna 45
axillena, Libellula 45
balteata, Macrodiplax 165
binotata, Trapezostigma 163
bison, Ophiogomphus 11
boreale, Enallagma 199, 227
borealis, Leucorrhinia 227

borealis, Progomphus 10
Brachymesia (see *gravida*)
Brechmorhoga (see *mendax*)
brevistylus, Hagenius 44
carolina, Tramea 46
Celithemis (see *fasciata*)
composita, Libellula 13
concisum, Enallagma 47
Cordulegaster (see *diastatops, dorsalis, erroneus*)
Cordulia (see *shurtleffi*)
corruptum, Sympetrum 13, 223
Coryphaeschna (see *ingens, virens*)
costiferum, Sympetrum 13
cyathigerum, Enallagma: 199, 200, 227
damula, Ischnura 16
danae, Sympetrum 198, 226
decisum, Sympetrum 13, 226
demorsa, Ischnura 16
designatus, Erpetogomphus .. 11
diastatops, Cordulegaster 251
disjunctus, Lestes 200, 227
dorsalis, Cordulegaster 12
dryas, Lestes 227
durum, Enallagma 224
Enallagma (see *boreale, concisum, cyathigerum, durum, pollutum*)
Epiaeschna (see *heros*)
eremita, Aeschna 226
Erpetogomphus (see *designatus*)
erroneus, Cordulegaster 251
Erythrodiplax (see *naeva, umbrata*)
eurinus, Lestes 251
fasciata, Celithemis 46
ferruginea, Orthemis: 45, 164, 224
flavescens, Pantala 165
forcipatus, Lestes 47
Gomphaeschna (see *antilope*)
Gomphoides (see *obscura, williamsoni*)
Gomphus (see *pallidus, plagiatus*)
gravida, Brachymesia 223
hageni, Tanypteryx 10
Hagenius (see *brevistylus*)
hastatum, Anomalagrion 165
heros, Epiaeschna 45
Hetaerina (see *titia*)
hudsonica, Leucorrhinia 226
hymenaea, Pantala 14, 165
Hyponeura (see *lugens*)
ingens, Coryphaeschna 164
insularis, Tramea 163
irene, Nehalennia 251
interrupta, Aeschna 198, 226
Ischnura (see *damula, demorsa, ramburii*)
jesseana, Libellula 45
juncea, Aeschna 226
junius, Anax 164
Lepthemis (see *vesiculosa*)
Lestes (see *disjunctus, dryas, eurinus, forcipatus*)
Leucorrhinia (see *borealis, hudsonica, proxima*)
Libellula (see *axillena, compositus, jesseana, quadrimaculata*)
lineata, Aeschna 226
longipennis, Pachydiplax 165
lugens, Hyponeura 15
lydia, Plathemis 13
Macrodiplax (see *balteata*)
mendax, Brechmorhoga 14
multicolor, Aeschna 12
naeva, Erythrodiplax 164
Nasiaeschna (see *pentacantha*)
Nehalennia (see *irene*)
nevadensis, Aeschna 12
obscura, Gomphoides 44
onusta, Tramea 224
Ophiogomphus (see *bison*)
Orthemis (see *ferruginea*)

Pachydiplax (see *longipennis*)
pallidus, Gomphus 44
palmata, Aeschna 225
Pantala (see *flavescens, hymenaea*)
pentacantha, Nasiaeschna 45
plagiatus, Gomphus 45
Plathemis (see *lydia*)
pollutum, Enallagma 224
Progomphus (see *borealis*)
proxima, Leucorrhinia 227
quadrimaculata, Libellula 226
ramburii, Ischnura 165
resolutum, Agrion 227
semiaquea, Tetragoneuria 45
semicircularis, Somatochlora: 12, 198, 226.
shurtleffi, Cordulia 226
sitchensis, Aeschna 225
Somatochlora (see *albicincta, semicircularis, tenebrosa*)
Sympetrum (see *corruptum, costiferum, danae, decisum*)
Tanypteryx (see *hageni*)
tenebrosa, Somatochlora 251
Tetragoneuria (see *semiaquea*)
titia, Hetaerina 46
Tramea (see *carolina, insularis, onusta*)
Trapezostigma (see *binotata*)
trifida. Triacanthagyna 164
Triacanthagyna (see *trifida*)
umbrata, Erythrodiplax 164
verticalis, Aeschna 12
vesiculosa, Lepthemis 165, 223
virens, Coryphaeschna 164
walkeri, Aeschna 12
walsinghami, Anax 11
williamsoni, Gomphoides 44

ORTHOPTERA

Acrididae 259
acuta, Tettigidea 157
agile, Orchelimum 36
agitator, Hapithus 103
aigialus, Conocephalus 158
allardi, Conocephalus 150
Amblycorypha (see *carinata, oblongifolia, rotundifolia, uhleri*)
americanus, Atlanticus 97
Anaxipha (see *exigua*)
angustipennis, Oecanthus 101
Anisolabis (see *maritima*)
apicialis, Tridactylus 103
Appalachia (see *hebardi*)
arachidis, Prolabia 155
assimilis, Gryllulus 100
asynamorus, Tachycines 98
atlantica, Paroxya 158
Atlanticus (see *americanus, davisi, hesperus, testaceus*)
attenuatus, Conocephalus 97
beutenmulleri, Paratylotropidia 156
bidens, Cycloptilum 159
bipunctata, Neoxabea 102
Blaberus (see *discoidalis*)
Blattidae 143
brevipennis, Conocephalus 38
brevipes, Ceuthophilus 98
bruneri, Nemobius 100
camellifolia, Pterophylla 34
Camptonotus (see *carolinensis*)
carinata, Amblycorypha 34
carolinensis, Camptonotus 98
carolinus, Nemobius 101
caudelli, Parcoblatta 157
caudellianus, Neoconocephalus. 35
Ceuthophilus (see *brevipes, divergens, gracilipes, lapidicola, latens, maculatus, meridionalis, nigricans, pallidipes, uhleri*)
cinerea, Nauphoeta 155
Clinocephalus (see *elegans*)
columbiana, Cyrtoxipha 156
concinnum, Orchelimum 37
confusus, Nemobius 156
Conocephalus (see *aigialus, allardi, attenuatus, brevipennis,*

fasciatus, nemoralis, nigropleuroides, nigropleurum, saltans, spartinae, stictomerus, strictus)
crepitans, Neoconocephalus ... 35
cubensis, Nemobius 138, 159
cubensis, Panchlora 155
curvicauda, Scudderia 33
Cycloptilum (see *bidens*)
Cyrtoxipha (see *columbiana*)
davisi, Atlanticus 97
delicatum, Orchelimum 37
Dendrotettix (see *quercus*)
Dicellura (see *Dicellurina*)
*Dicellurina** 150
discoidalis, Blaberus 155
divergens, Ceuthophilus 99
domesticus, Gryllulus 100
elegans, Clinocephalus 157
ensiger, Neoconocephalus 35
exclamationis, Oecanthus 101
exigua, Anaxipha 102
exiliscanorus, Neoconocephalus 36
Falcicula (see *hebardi*)
fasciata, Scudderia 33
fasciatus, Conocephalus 38
fasciatus, Nemobius 100
fidicinium, Orchelimum 158
fulvescens, Parcoblatta 157
furcata, Scudderia 33
glaberrimum, Orchelimum ... 36
gladiator, Orchelimum 36
gracilipes, Ceuthophilus 98
griseus, Nemobius 156
Gryllacrididae 98
Gryllidae 100, 133
Gryllotalpa (see *gryllotalpa, hexadactyla*)
gryllotalpa, Gryllotalpa 159
Gryllulus (see *assimilis, domesticus*)
Hadenoecus (see *puteanus*)
Hapithus (see *agitator*)
hebardi, Appalachia 259
hebardi, Falcicula 159
hesperus, Atlanticus 156
hexadactyla, Gryllotalpa 103
hoosieri, Paraoxya 156
impudicus, Melanoplus 157
intertexta, Mermiria 157
lapidicola, Ceuthophilus 99
lata, Parcoblatta 157
latens, Ceuthophilus 99
latipennis, Oecanthus 102
Leucophaea (see *maderae*)
lyristes, Neoconocephalus ... 36
maculatus, Ceuthophilus 99
maculatus, Nemobius 100
maderae, Leucophaea 155
maritima, Anisolabis 156
Melanoplus (see *impudicus, pachycerus, stonei*)
meridionalis, Ceuthophilus ... 98
Mermiria (see *intertexta*)
Microcentrum (see *retinerve, rhombifolium*)
militare, Orchelimum 158
minor, Orchelimum 37
minutus, Tridactylus 103
Miogryllus (see *verticalis*)
modesta, Montezumina 156
Montezumina (see *modesta*)
Nauphoeta (see *cinerea*)
nebrascensis, Neoconocephalus 158
Nemobius (see *bruneri, carolinus, confusus, cubensis, fasciatus, griseus, maculatus, palustris, socius, sparsalsus, tinnulus*)
nemoralis, Conocephalus 38
Neoconocephalus (see *caudellianus, crepitans, ensiger, exiliscanorus, lyristes, nebrascensis, palustris, retusus, robustus, triops*)
Neostylopyga (see *rhombifolia*)
Neoxabea (see *bipunctata*)
nigricans, Ceuthophilus 99

nigricornis, Oecanthus 101
nigripes, Orchelimum 37
nigropleuroides, Conocephalus 159
nigropleurum, Conocephalus.. 97
niveus, Oecanthus 101
oblongifolia, Amblycorypha .. 34
obscura, Schistocerca 156
Oecanthus (see *angustipennis, exclamationis, latipennis, nigricornis, niveus, pini, quadripunctatus*)
olivacea, Orphulella 157
Orchelimum (see *agile, concinnum, delicatum, fidicinium, glaberrimum, gladiator, militare, minor, nigripes, pulchellum, silvaticum, superbum, volantum, vulgare*)
Orocharis (see *saltator*)
Orphulella (see *olivacea*)
pachycerus, Melanoplus 156
pallidipes, Ceuthophilus 99
palustris, Nemobius 100
palustris, Neoconocephalus ... 35
Panchlora (see *cubensis*)
Paratylotropidia (see *beutenmulleri*)
Parcoblatta (see *caudelli, fulvescens, lata*)
Pardalophora (see *phoenicoptera*)
Paroxya (see *atlantica, hoosieri*)
phoenicoptera, Pardalophora .. 157
Phyllopalpus (see *pulchellus*)
pini, Oecanthus 101
pistillata, Scudderia . 33
Prolabia (see *arachidis*)
prorsa, Tettigidea 157
Pterophylla (see *camellifolia*)
pulchellum, Orchelimum 37
pulchellus, Phyllopalpus 102
puteanus, Hadenoecus 98
quadripunctatus, Oecanthus .. 101
quercus, Dendrotettix 158, 259
retinerve, Microcentrum 158
retusus, Neoconocephalus 35
rhombifolia, Neostylopyga ... 155
rhombifolium, Microcentrum . 34
robustus, Neoconocephalus ... 158
rotundifolia, Amblycorypha .. 34
saltans, Conocephalus 97
saltator, Orocharis 103
saxatile, Spharagemon 157
Schistocerca (see *obscura*)
Scudderia (see *curvicauda, fasciata, furcata, pistillata, septentrionalis, texensis*)
septentrionalis, Scudderia 33
silvaticum, Orchelimum 36
socius, Nemobius 138
sparsalsus, Nemobius 133
spartinae, Conocephalus 159
Spharagemon (see *saxatile*)
stictomerus, Conocephalus 158
stonei, Melanoplus 158
strictus, Conocephalus 38
Supella (see *supellectilium*)
supellectilium, Supella 143
superbum, Orchelimum 38
Tachycines (see *asynamorus*)
testaceus, Atlanticus 97
Tettigidea (see *acuta, prorsa*)
Tettigoniidae 150
texensis, Scudderia 33
tinnulus, Nemobius 100
Tridactylus (see *apicialis, minutus*)
triops, Neoconocephalus 158
uhleri, Amblycorypha 34
uhleri, Ceuthophilus 99
verticalis, Miogryllus 100
volantum, Orchelimum 38
vulgare, Orchelimum 36
Xiphidion (see *Conocephalus*)

NON-HEXAPODA

albovittata, Wala 258
Argiopidae 258
auximus, Gosiphilus* 254
Brachygeophilus (see *leionyx*)
ectypa, Epeira 259
Epeira (see *ectypa, stellata, verrucosa*)
Gosiphilus (see *auximus*)
Hentzia (see *palmarum*)
lamprus, Leptodampius* 255
leionyx, Brachygeophilus* 255
*Leptodampius** 254
(See also *lamprus*)
palmarum, Hentzia 258
stellata, Epeira 259
Synonymy in spiders 258
Salticidae 258
verrucosa, Epeira 259
Wala (see *albovittata*)

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This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

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